MAR 5 1898

THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. MARCH 3, 1898. CHICAGO, ILL. NUMBER 9

CLING-SURFACE
IS BETTER THAN THE BEST BELT DRESSING AND MUCH MORE.
CLING-SURFACE MFG. CO.,
10 Court St., Buffalo.
.. AN ..
. IDEAL .
. BELT .
Made possible by Cling-Surface.

H. C. FRICK COKE CO.
Post Office, PITTSBURG, PA.
Mines and Ovens in the Connellsville Coke Region, Penna.
CENUINE CONNELLSVILLE COKE
For Blast Furnaces and Foundry Cupola Work; also Crushed Connellsville Coke (substitute for Anthracite Coal) for manufacturing and domestic purposes. 13,500 Ovens. Daily Capacity 30,000 tons of Coke. ☞Direct connections with all Railroads entering the Region. Quotations, Freight Rates, Pamphlets giving full information, promptly furnished on application.
Headquarters for .....

Moore's Anti-Friction
DIFFERENTIAL
CHAIN HOIST.
Adjustable Automatic Brake.
Self sustaining at every point.
Highest Efficiency
A New Movement.
A Perpetual Compound Lever.
Powerful, Simple and Durable.
Light, Compact and Strong.
NINE SIZES.
Half Ton to Ten Tons Capacity.
ALSO
HAND POWER CRANES, WINCHES, &c.
Moore Manufacturing Co.,
CLEVELAND, O.

FORSTER, WATERBURY & Co.
INCORPORATED.
PIG IRON, STEEL, ORE, COKE.
636-638 Rookery, CHICAGO.

THE CHICAGO SCREW CO.
TRADE-MARK
SCREWS
94-108 W. WASHINGTON ST. CHICAGO

DICKMAN & MACKENZIE,
CLEVELAND, 71 Atwater Bldg.
CHICAGO, 1224 Rookery Bldg
Mining properties examined. Ores sampled at mines, furnaces and all lake ports.
General analyses of Ores, Slags, Metals, Fuel Foundry Materials and Products, etc.
CHEMISTS AND ENGINEERS.

ENTERPRISE BOILER COMPANY
YOUNGSTOWN, O.
Draught Stacks, Blast Furnaces and Heavy Plate Work a Specialty.
Write for Estimates.

METAL STAMPING.
We do all kinds of SMALL STAMPING and FORMING, from Steel, Iron or Brass, from your Dies or we can make Dies for you.
Send sample or sketch for price.
THE OLIVER P. CLAY CO.
416 Arcade, Cleveland, Ohio.

"Metallurgy of Cast Iron," Price $3.

POWER TRANSMISSION
W. A. JONES FOUNDRY & MACHINE CO.
53-59 So. JEFFERSON ST. CHICAGO

Our galvanized sheets bear this stencil

We make only one quality and use no other brand as a trade mark
Apollo Iron and Steel Company
Vandergrift Building
Pittsburgh

See large Advertisement of
B. F. STURTEVANT CO.,
Boston, Mass.,
On Page 24.
BLOWERS, FANS, ENGINES.

TURNBUCKLES.

Cleveland City Forge & Iron Co.,
CLEVELAND, O.

DO YOU USE BOILERS ?
The Carnegie Steel Co., The Illinois Steel Co., The Apollo Iron & Steel Co., The Shoenberger Steel Co., Jones & Laughlins, Carrie Furnace Co. and National Tube Works Co., are among those who use the
"CAHALL" BOILERS.
Illustrated descriptive catalogue free on application.
Cahall Sales Department, Pittsburg, Pa.

HAND POWER — BELT
HOISTING MACHINERY
CRANES
THE CASE MFG. CO. COLUMBUS, O. U.S.A.
STEAM — ELECTRIC

W. S. ROCKWELL & CO.,
OIL FURNACES.
26 Cortlandt St., New York City.

SHIFFLER BRIDGE COMPANY,
BUILDING DEPARTMENT.
SPECIALTIES: Steel and Iron Buildings for Rolling Mills, Tin Plate Plants, Steel Works, Foundries, Factories, Roof Trusses, Girders, Columns, Bessie Corrugated Iron, Etc.
Main Office and Works:
48th Street and A.V. Ry., PITTSBURG, PA
Branch Offices:
1123 Betz Building, Philadelphia, Pa.
45 Broadway, New York, N. Y.
228 Lumber Exchange, Minneapolis, Minn.
1243 Marquette Building, Chicago, Ill.

It Pays to advertise in The Iron Trade Review.

SEND FOR CATALOGUE I
AND LEARN WHY
U. S. Injectors
— ARE —
SUPERIOR TO ALL.
Catalogue free if you mention Iron Trade Review.
American Injector Co., Detroit, Mich.

THE UPSON NUT CO., Cleveland, O.
- - - MANUFACTURERS OF - - -
MACHINE AND CARRIAGE BOLTS, HOT FORGED AND COLD PUNCHED NUTS, LAG SCREWS, BOLT ENDS, WASHERS, ETC. Catalogue and Prices on Application.

Riveted Steel Pipe, Galvanizing Pots, Tank Cars.

WM. B. POLLOCK & CO.

with inquiry please give ad. No. 6.

YOUNGSTOWN, O.

Blast Furnaces, Steel Plants, Boilers, Tanks, etc.

Red Cedar,

PINE OR CYPRESS.

Any Size, Any Shape.

WILLIAMS MFG. CO.,
Kalamazoo, Mich.

Miller, Wagoner, Fieser & Co.

PIG IRON, COKE.

Columbus, O., Hayden Bldg.
Chicago, Ill., Monadnock Bldg.
St. Louis, Mo., Bank of Com. Bldg.

Steel Stamps and Stencils.

FLEHARTY, J. H. & Co., Rubber Stamps Seals, Stencils, Automatic Check Punches and Numbering Machines. 92 Seneca St.

STILWELL'S

PATENT LIME-EXTRACTING

HEATER AND FILTER

COMBINED.

Is the only lime-extracting Heater that will prevent Scale in Steam Boilers, removing all impurities from the water before it enters the boiler.

Thoroughly Tested.

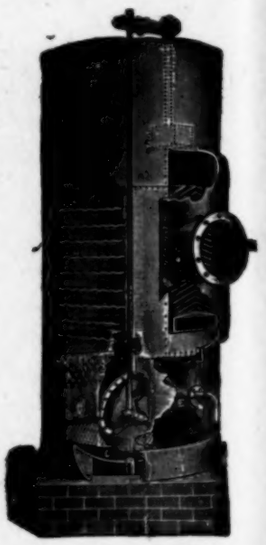
OVER 8,000 OF THEM IN DAILY USE.

ILLUSTRATED CATALOGUE.

Stilwell-Bierce & Smith-Vaile Company,

DAYTON, OHIO.

CHICAGO OFFICE, 63 S. Canal St.



Air Compressors.

Rock Drills.

Channelers.

We manufacture Air Compressors suitable for all kinds of work, and a variety covering every size, from the small Belt-driven Compressor for small shops and pumping small quantities of water, up to the large Corliss Compound Compressors for the greatest manufacturing or mining plants of the world. As an instance of the wide range covered by Compressors of our make, we name the following that we have recently furnished, all of whom are equally distinguished in their line:

Newport News Shipbuilding Co., Newport News, Va.; Duplex Compressor for operating a large number of pneumatic tools; Hughes Bros. & Bangs, Bellevue, Del.; Valdosta Water Works, Valdosta, Ga., for pumping water; the Manhattan Elevated R. R. Co., New York, for machine shop purposes; Walker Co., Electric Works, Cleveland, Ohio; Harrison Granite Co., Barre, Vt., pneumatic tools; L. L. Manning, Plainfield, N. J., Marble Works; the Anaconda Copper Mining Co., Butte, Montana.

Our Catalogues give information on the subject of Air Compressors and other subjects regarding the application of Compressed Air.

Coal Cutters.

The Pohle

Air Lift Pump.

The Ingersoll-Sergeant Drill Company, Havemeyer Building, New York.

THE DAVIS & EGAN MACHINE TOOL CO.

Builders of Modern Machine Tools.

SEND FOR OUR 1898 CATALOGUE.

WORKS: Cincinnati, Ohio, U. S. A.

NEW YORK, 107 Liberty St. CHICAGO, 68 S. Canal St. BOSTON, 36 Federal St. ST. LOUIS, 720 N. 2d St. PHILADELPHIA, 19 N. 7th St.

AIR COMPRESSORS

Thoroughly up-to-date and the most simple, durable and economical machines on the market. Built on improved lines.

ROCK DRILLS, AIR LIFT, PUMPS, ETC.

Send for catalogue

RAND DRILL CO.

100 Broadway, New York.
1328 Monadnock Block, Chicago.

O. TEXTOR,

Chemist and Metallurgist

Analyses made of Metals, Ores, Fuels and Supplies for Furnaces, Steel Works and Foundries.
Ores sampled at mines, furnaces and lake ports.
Advice furnished to operators of Blast Furnaces Steel Works and Foundries.
Mining properties reported upon.
For 12 Years Chief Chemist to the Cleveland Rolling Mill Co.

158 Superior St., CLEVELAND, O.

AIR COMPRESSORS

For every application of Compressed Air Power

Complete Catalogue upon application.

Clayton Air Compressor Wks.

26 Cortlandt St., NEW YORK.

Cable Address "METALFAC-CHICAGO" ABC Code

E. H. STROUD & CO.

METAL FACTORS.

The Products of and Supplies for

IRON · STEEL · TIN-PLATE · BRASS
COPPER · LEAD & · ZINC · WORKS.

36 La Salle Street *100 William Street*

CHICAGO. NEW YORK.

ECLIPSE ELECTROTYPE AND ENGRAVING CO.

58 FRANKFORT ST

TELEPHONE MAIN-1916 CLEVELAND, OHIO.

F. A. EMMERTON,

Analytical Chemist,

AND METALLURGIST.

Ores sampled at lake ports, mines and furnaces.
Mines and Metallurgical Processes examined.
Analyses made of Ores, Metals, Fuels, Railroad and Foundry Supplies, etc.

9 Bratenahl Building, CLEVELAND, O.

THE CENTRAL ELECTROTYPE AND ENGRAVING CO.

263-271 St. Clair St. Cleveland O

WOOD ENGRAVING ELECTROTYPING.

Wire Nail Machinery

30-INCH CHUCKING LATHES.

RADIATOR LOOP BORING MACHINES.

Wm. Glader, 160 & 162 So. Clinton st. Chicago

C. K. PITTMAN,

SHIPPER OF

Coal & Coke

Best Grades of Coke a Specialty.

975 Old Colony Building, Chicago

THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. MARCH 3, 1898. CHICAGO, ILL. NUMBER 9

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

While the campaign of war rumors is still effective in retarding large undertakings, the public mind is less disturbed than in the preceding week and more given to business. In some quarters more activity is reported in iron and steel—no pronounced movement, but a resumption of the regular buying that has been interrupted to an extent in the past fortnight. The most important event of the week in the Central West is the acquisition by the Carnegie Steel Co., of the two modern furnaces of the Carrie Furnace Co., having a weekly capacity of above 4,000 tons. These additional furnaces will practically take care of the pig iron shortage of the purchaser, generally rated at about 20,000 tons a month. The merchant furnace interest is naturally well satisfied to have the Carnegie Co.'s demand for more metal met by a reduction in the number of independent stacks than by additions to the number of the Duquesne monsters. The move has had little or no effect on prices of March iron, but second quarter deliveries are a trifle weaker, $9.75, valley, being now a general quotation. The selling side had been counting on further considerable purchases of iron by the Pittsburg interest, which by being distributed would have strengthened all sellers. Steel billets, reflecting the heavy consumption of all forms of steel, are now held well up to $15.25, Pittsburg maker's mill. The spread between Bessemer pig iron and steel thus continues to be greater than conversion costs and normal profits would indicate. There is a firmer market for tin-plate bars, and tin plate manufacturers are making somewhat higher quotations on second quarter business. The makers of Southern iron have reached an agreement that includes nearly all the Alabama and Tennessee furnaces. It provides for a sales commissioner and is expected to result in a close adherence to $7.25, Birmingham, for No. 2 foundry, but is carefully designed to insure the parties to it from liability to attack on anti-trust grounds. A committee of the Southern producers has visited Chicago and on investigation discredits reports of low prices on local irons. If maintained, the new arrangement may work some improvement in the New England situation which has been especially demoralizied by the active four-cornered contest of Alabama, Virginia, Eastern Pennsylvania and Western New York furnaces. Furnished material demand is of steady volume, and it is anticipated that March will give some indication of the extent to which the general hope entertained for 1898 will be realized. Here and there prices have yielded of late, particularly on bars, which in price are still the most unpromising department of the market, and to a less extent on sheared plates. The agreement on structural shapes appears to be well maintained. Nothing has developed in the wire consolidation and nothing is expected under the present foreign situation, though there have been further conferences in New York the past week. At Pittsburg there is renewed talk of plans for new rod mill capacity in the event of the consolidation becoming a fact. The meeting of wire nail manufacturers called for Pittsburg last week was not held and $1.45 will be the maximum for wire nails in March, as immediate demand is not such as to warrant the proposed advance to $1.50. The published exhibit of last year's export trade in iron and steel has been an encouragement to the trade and an increase to 1,000,000 tons in 1898 is regarded as not improbable. Lake Superior iron ore producers have not formally announced prices on Bessemer ores as yet, but will within another week. A beginning has been made in sales of non-Bessemers, at figures close to last year's basis. Cuban ores sold for shipment to Scotland, Wales and Germany in the latter part of 1897 amounted to 50,000 tons, and this business its likely to grow in 1898.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
807 TRADESMEN'S BUILDING, MAR. 2.

The deal by which the Carrie Furnaces, one of the three independent furnace interests of Pittsburg, become Carnegie Steel Co. property, has monopolized attention since its announcement, Saturday. In the market a slight advance in steel is the one noteworthy feature. If the condition of steel mills in near-by districts as regards sales is correctly gauged, a shortage of steel such as was seen last summer would seem to be unavoidable. For finished material, February was a month of even business, but not of as large tonnage as was January or December.

PIG IRON.—Pig iron circles have been interested in the Carnegie-Carrie Furnace deal closed in the week, whereby Pittsburg loses another independent furnace, and an important factor in the local Bessemer, foundry and mill iron market is removed. Further than that the purchase is complete and that the metal produced will be used at the Homestead Steel Works, directly across the Monongahela River. No details have been made public. Bessemer pig in the valleys is weaker than ten days ago. For second quarter iron $9.75 valley is quoted. There is little or no prompt iron. Low sales of No. 2 foundry are reported from the valley, $9.25 and a shade lower being noted. Local selling agents and furnaces are refusing to cut $10. Quotations are made as follows:

Bessemer, second quarter valley		$ 9.75
Bessemer Pittsburg, second quarter	$ 10.40 to	10.50
No. 1 Foundry	10.40 to	10.50
No. 2 Foundry	10.00 to	10.15
No. 3 Foundry	9.50 to	9.75
Gray Forge	9.00 to	9.15

BILLETS.—Steel has tightened perceptibly in the last ten days under the announcement that valley and Wheeling, as well as Pittsburg, mills were covered for weeks, and in some cases for months ahead. At two mills at least shipments can not be promised before July. Sales are reported from $15 to $15.25 at local mill and asking prices are now $15.25 to $15.50, at Pittsburg maker's mill. The tonnage record of last week in the Bessemer department of Jones & Laughlins, Ltd., was in excess of that for any equal period in their history.

SHEET BARS.—On sheet and tin bars mills are as well fixed as on billets. Sheet bars are bringing $17 and tin bars $17.25, maker's mill.

RODS.—A meeting of the leaders in the rod movement was held in New York on Monday, and adjourned without action till Tuesday. Rods where obtainable are bringing $23 and $23.50, maker's mill.

SHEETS.—In spite of the fact that sheet mills generally are well sold, while some are asking 2.05c for No. 28, prices have been made in Pittsburg during the week as low as any point touched last summer. The low prices are being made on heavier gauges than 28, for which the bulk of orders are placed. Galvanized sheets are quoted at 80 and 7½ off list.

PLATES.—The unusually heavy demand for universal plates is rather increased than abated. The 8,000 tons of plates needed on the 650 steel cars ordered last week will be in the main from universal mills and are for quick delivery. The order was placed during the week with a local mill. On

sheared plates mills are not so well fixed and are quoting Bessemer and open-hearth tank, 1c; shell, 1.10c; flange, 1.20c.

STRUCTURAL MATERIAL.—Pool rates are holding on all shapes and no charges of evasions are heard thus far. The specifying of acid steel on the new East River bridge shuts out Pittsburg mills except on plates—a small part only of the tonnage. State Capitol affairs are untangled and the bids presented have not been acted upon. Shapes are quoted as follows f. o. b. mill: Beams, 3 to 15 inches, 1.15c; 18 to 24 inches, 1.25c; zees, 1.15c; tees, 1.20c. Universal plates in connection with other shapes are selling as low as 1c; alone, 1.10c.

BARS.—Late in the week steel bars were being marketed as low as 90c. A 2,500 ton order was taken by a local mill which at once advanced its quotations to 95c minimum and the market stands there. Valley common bar iron sold in Pittsburg during last week at 95c. Branded muck bar iron is fairly active.

PIPES AND TUBES.—The advance in oil has caused a general stirring in the oil country. A number of good oil supply inquiries have appeared in primary stages and some promotors have taken prices. The first indications of spring trade in merchant pipe are also seen. Base discounts are as follows: Butt weld, black, 57 per cent off; lap weld, black, 67 per cent off; butt weld, galvanized, 50 per cent off; lap weld, galvanized, 55 per cent off. The additional discounts are 6 tens and 5 per cent on small lots and 6 tens and 7½ per cent on attractive orders Discounts on merchant boiler tubes are as follows: 2¼ inch and smaller, 72½ per cent off; 2½ inch and larger, 75 per cent off.

IRON AND STEEL SKELP.—Skelp is weak still and low sales continue to be reported. We quote: Grooved steel skelp, 90c to 95c; sheared steel skelp, 1c to 1.07½c; grooved iron skelp, 1.05c to 1.10c; sheared iron skelp, 1.12½c to 1.15c.

SPELTER.—This metal made another advance in the week and sales are reported at $4 and $4.05 and a sale of remelted at $3.97½.

FERRO-MANGANESE.—The quotation is $47 and $47.50 for 80 per cent domestic.

RAILS AND TRACK SUPPLIES.—Rail circles are quiet for the time. Track supplies are being used in large quantities and the mills are crowded. In addition to the first shipment of railroad spikes ever made to Germany, Dilworth, Porter & Co., Ltd., have just finished shipment of 10,000 kegs of spikes to Japan. On track material we quote as follows: Iron track bolts, 1.65c to 1.70c; steel spikes, 1.45c to 1.55c; splice bars, 1.10c to 1.15c; links and pins, 1.20c.

OLD MATERIAL.—Sales have been made in Pittsburg during the week on the basis quoted below: Iron rails are higher and have sold at $14.25. We quote: No. 1 wrought, $11.50 net; short length steel rails, $11; steel rails, 6 feet and over, $10.50; coil spring, $11.25; car wheels, $10.35 gross; wrought turnings, net, $7.75; heavy melting stock, $10.50; cast borings, $6.25; heavy busheling scrap, $9.75; crop ends billets and blooms, run of mill, $11.

CLEVELAND.

Office of *The Iron Trade Review*,
27 Vincent St., March 2.

Iron ore matters have been in statu quo the past week, so far as the old range Bessemer product is concerned. Nor has there been any effort to do business in Mesabi ores, following the recent Chicago transaction. Some sales of non-Bessemer ores have been made—a 100,000-ton lot from the Negaunee district at a price close to that of last season, and a lot from the Crystal Falls district, both going to Ohio furnaces. It is not expected that quotations on old-range ores will be made to furnace companies until next week. Interesting in connection with the competition between Cuban and other outside ores with those from Lake Superior, for the Eastern trade, is the fact that further shipments of Spanish-American Iron Co. ores from Cuba to the British Isles and Germany will be made this year. Something over half the 50,000 tons of these ores sold abroad last year has been sent to its destination. The slight advance in the price of Lake Superior ores this year will be just that much assistance to foreign ores in holding a place in the Eastern trade, but as a general proposition the foreign market is apt to be more cultivated than heretofore by producers of Cuban ores, under the low range of prices that promises to obtain in this country.

PIG IRON.—Sales of Bessemer pig iron for March shipment have been made at $9.50 in the valley the past week and at $9.75 for second quarter delivery. One transaction of 3,000 tons at $9.90, valley, second quarter delivery, is reported but there are special features which explain the unusual price. The market for Bessemer is scarcely as firm as last week. Yet the taking of two Pittsburg merchant furnaces out of the account, through the Carnegie Steel Co.'s purchase of the Carrie Furnace plant, is construed as a favorable factor from the standpoint of the merchant furnaces. While the Carnegie Steel Co. will now be out of the market, the probable amount of its needs above its own furnace output has been a mere estimate. On the other hand the known curtailment of the merchant furnace production, through the transfer, is a definite amount. The transaction is significant in that it seems to mark a pause, for the present, in the erection of 600-ton blast furnaces at Duquesne. Foundry iron is sentimentally better, under the Southern advance, but the run of business is very moderate. Forge iron in the valleys and Pittsburg is again approximating a common basis—$9 to $9.15. There have been further sales of Lake Superior charcoal iron at the recent low figures, which are close to the coke basis. We quote f. o. b. Cleveland:

Bessemer, second quarter	10 40	Valley Scotch No. 1	$10 40@10 65
No. 1 Strong Foundry	10 40	Valley Scotch No. 2	9 90@10 15
No. 2 Strong Foundry	9 90	Gray Forge	9 15
No. 3 Foundry	9 40@ 9 50	Lake Superior Charcoal	11 90

BILLETS AND SHEET BARS.—The market on billets is unchanged at about $15.50, with the local mill quite well sold. Some additional inquiries are up for sheet and tin plate bars, several mills with headquarters here making inquiries for a total of over 15,000 tons. The Pittsburg basis is higher, the present quotation being $17 for tin plate bars.

FINISHED MATERIAL.—There has been no special feature in the local market for rolled products. Two Northern Ohio railroad bridges have taken 400 tons of material, and an order for upwards of 1,500 tons of splice bars for the Lake Shore road went to Pittsburg. With all the record of low prices in bars they have been another shade weaker since last report. Competition for Cleveland orders has brought the delivered price on iron bars below 1c, some recent business going at 50c a ton lower. Inquiries are pending for iron and steel bars from local bolt concerns. The Pittsburg basis on steel is .95c, and on desirable business this has been shaded. Sheets have been in fair demand and are quoted at 2.10c to 2.15c, Cleveland for No. 28. Wire is $1.20 at local mill and wire nails $1.45.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1142 MONADNOCK BLOCK, March 2.

Generally speaking, sales last week were in excess of those of the week before. Most classes of material were in good demand, and oders were larger and more frequent than in the early weeks of February. Inquiries appear to be increasing somewhat, and business in the next few weeks is expected to be fully up to the average of the past month. Southern pig iron producers held a final meeting last week, and came to an arrangement for handling their product which it is expected will enable them to avoid cutting of prices. Car orders are large, and two good contracts are to be placed soon, the B. & O., and the Union Pacific.

PIG IRON.—The meeting of the Southern producers of pig iron at Birmingham last week resulted in an arrangement between several of the furnace companies. All are not included, although it is hoped that the outside furnaces will be brought into the fold within a short time. It was arranged that the sales of all the furnaces in the agreement should go through the hands of a commissioner. J. B. Simpson, who has been in charge of the coal sales of the same companies, has been appointed to the new position. The furnace companies are to hold their prices up to the quotations agreed upon, and which are given below. It was developed at the meeting that some of the sales agents of the producers had been reporting sales of Northern irons in this market at prices much under those made by the Southern furnaces, and below what the Northern furnaces claimed to be getting. This, it was said, had resulted in the demoralization of the market to a large extent, and had caused considerable cutting on the part of the Southern furna es. President Baxter, of the Tennessee company, and President Wills, of the Sheffield company, were

appointed a committee to investigate the conditions of affairs at Chicago. These gentlemen were in this city last week, and as the result of their investigation, made a report that there is no cutting by the local furnaces, but that, on the contrary, they are so well sold up for a long time into the future that their prices had been advanced considerably over the Southern quotations. Upon this report, the Southern furnaces set their prices on a basis of $7.25, Birmingham for No. 2 foundry iron, and agreed to maintain this in every instance. While the meeting at Birmingham was in progress, and owing to some misunderstanding, prices on Southern irons were reduced 25 cents a ton from these figures. An agricultural implement manufacturer it is reported, bought above 6,000 tons of Southern iron, at $10.10 for No. 2, this as well as some other large sales, being made during the short time the reduced prices lasted. Sales of Southern iron in this market were very large last week, and included several orders of over 2,000 tons, one of them running over 3,000 tons. Small lot business also ran up quite well, making the week's total as large as in any like period for a long time. Local furnaces reported a good tonnage, but nothing like that sold by the Southern interests. The former are so well sold up that it would be impossible for them to take very many orders for delivery within the next three or four months, or longer. The demand for iron, in both large and small lots, is excellent, and sales will undoubtedly continue good for the next few weeks. Quotations are unchanged as follows:

Lake Sup. Charcoal	$11 50@12 50	South'n Coke No. 3	$10 10@10 35
Local Coke Fdy. No. 1	11 50@12 00	Southern No. 1 Soft	10 60@10 85
Local Coke Fdy. No. 2	11 00@11 50	Southern No. 2 Soft	10 35@10 85
Local Coke Fdy. No. 3	10 75@11 00	South'n Silveries	11 25@11 50
Local Scotch Fdy. No. 1	11 50@12 00	Jackson Co. Silveries	12 50@14 50
Local Scotch Fdy. No. 2	11 00@11 50	Ohio Strong Softeners	12 00@12 25
Local Scotch Fdy. No. 3	10 75@11 00	Alabama Car Wheel	14 00@16 00
South'n Coke No. 1	10 60@10 85	Malleable Bessemer	10 75@11 00
South'n Coke No. 2	10 35@10 85	Coke Bessemer	11 50@12 00

BARS.—Reports are current of very low sales of both iron and steel bars. One sale is said to have been made, of common iron, as low as 95c, delivered. There is very little doubt that 1c could be easily done by a good buyer, and very likely less. A considerable amount as placed in the week, of both iron and steel, and the demand appears to be quite as large now as at any time in the past month. Several large contracts were placed, including one by an agricultural implement manufacturer for several thousand tons. Quotations are made at 1c to 1.05c for common iron, 1.05c to 1.15c for guaranteed iron, and 1.10c for soft steel bars.

CAR ORDERS.—The B. & O. order mentioned last week has not yet materialized, and the trade apparently does not expect it to for some time. It is reported that the Union Pacific is figuring on from 1,000 to 3,000 cars, and will give out the order very soon. Other business, in small lots, has been good, and sales of the material entering into cars were quite large last week.

RAILS AND TRACK SUPPLIES.—It is siad that the local mills have an order for 5,000 tons of rails for a new Klondike road, placed last week. Some time ago they took an order for rails to go to that territory, and this is understood to be an additional order. Other business was light, and did not include any large orders. Quotations are unchanged, as follows: Rails, $20 to $22.50, according to specifications; steel splice bars, 1.20c to 1.30c; track bolts, with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.60c to 1.65c.

BILLETS AND RODS.—Very little business is being done in this market, and nearly all of what is being placed goes to Eastern mills, as the local mills are not in position to accept much further business. Quotations are maintained at $17.50 for billets and $25 for rods.

STRUCTURAL MATERIAL.—General business was very good last week, nearly all of it coming in small lots. The contract for the Wabash building, at St. Louis, was given out, the steel going to Pittsburg. Aside from this no large business was placed. Prices on plates and angles are weak, and those we quote could undoubtedly be shaded a little. Quotations are made as follows: Beams, 15-inch and under, 1.30c to 1.35c; 18, 20 and 24-inch, 1.40c to 1.45c; angles, 1.15c to 1.25c; plates, 1.10c to 1.15c; tees 1.35c to 1.40c. Small lots from stock are quoted at one-quarter to one-half cent higher.

PLATES.—Considerable business was placed last week, nearly all of it in small lots, although one or two good orders were given out. The market is not at all strong, and our quotations could undoubtedly be lowered on good specifications. Prices are as follows: Tank steel, 1.10c to 1.15c; flange steel, 1.40c to 1.45c; fire box steel, 1.85c to 5c.

SHEETS.—There is a very good demand for both black and galvanized sheets, and sales last week were quite large, including some good sized orders. Quotations are made at 2.05c to 2.15c for No. 27 black, and 80 and 7½ to 80 and 5 per cent discount for galvanized.

MERCHANT STEEL.—The demand is excellent, and several good contracts for season's supply were placed last week. Small order business, both mill and store, was very good. Prices follow: Open-hearth spring, tire and machinery steel, 1.65c to 1.75c; smooth finished machinery steel, 1.60c to 1.65c; smooth finished tire, 1.45c to 1.50c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SCRAP.—There is still a decided shortage of several kinds of scrap. Sales last week were only fair, and showed no increase over the week previous. It is hardly expected that buying will be heavy for some time ahead. Quotations are unchanged as follows:

Old iron rails, gross	$12 50@$13 00	Axles, net	$14 25@$14 75
Old steel rails, long, gr.	10 50@ 11 00	Cast borings, net	4 00@ 4 25
Old steel rails, short	9 25@ 9 50	Wrought turnings, net	5 50@ 6 00
Old wheels, gross	11 00@ 11 50	Axle turnings, net	7 25@ 7 50
Railroad forge, net	12 00@ 12 50	Mixed steel, gross	7 25@ 7 50
Dealer's forge, net	10 50@ 11 00	Stove plates, net	6 00@ 6 25
No. 1 mill, net	7 50@ 8 00	Heavy melting steel, gr.	8 25@ 8 50
Heavy cast, net	8 50@ 9 00	Old iron splice b., net.	13 25@ 13 50
Malleable cast, net	8 00@ 8 50		

CINCINNATI.

February 28.

In their comment on the local pig iron market the past week, Rogers, Brown & Co. say: "The notable transactions of the past week have been confined mostly to Lake Superior charcoal and Northern coke brands. The former continues to sell at exceedingly low prices, although the stocks on hand are decreasing quite rapidly. Northern coke brands are steady, but it has not been possible to get an advance to correspond with the better feeling in Bessemer. In Southern iron, trading has been limited. The reports from Birmingham last week were calculated to make buyers think that a war of extermination had been started between the larger and the smaller companies, and prices would consequently go lower. It is almost unnecessary to state that the reports were devoid of truth. There is no desire on the part of the Southern companies to do any booming, but they are firmly convinced that nothing would be gained by a demoralization of prices, for consumers recognize that at $6.50 Birmingham, for No. 4 foundry and gray forge, there is very little profit to the maker. The tendency this week is to adhere to current quoted prices, leaving it for the consumer to decide which brand he will favor at those figures. Quotations are as follows: Southern coke, No. 1 foundry, $9.75; No. 2, $9.50; No. 3, $9.25; gray forge, $8.75; mottled, $8.75; No. 1 soft, $9.75 to $10; No. 2, $9.50 to $9.75; Belfont coke, No. 1, Lake Superior, $11 to 11.50; Belfont coke, No. 2, Lake Superior, $10.50 to $10.75; Hanging Rock charcoal, No. 1, $14.50 to $15.50; Tennessee charcoal, No. 1, $12.50 to $13; Jackson Co. silvery, No. 1, $12.50 to $13; Standard Georgia car wheel, $14.25 to $15.

BUFFALO.

February 28.

The local market has been quiet for the past week with the exception of two or three contracts for several thousand tons, one of them being for charcoal iron at a considerable cut from the price mentioned below. The feeling among the larger consumers seems to be gaining ground that nothing can be gained by putting off longer contemplated purchases. We quote below for cash f. o. b. cars Buffalo: No. 1 strong foundry coke iron, Lake Superior ore, $11 to $11.25; No. 2 strong foundry coke iron, Lake Superior ore, $10.50 to $10.75; Ohio strong softener No. 1, $11.50 to $11.75; Ohio strong softener No. 2, $11 to $11.25; Jackson Co. silvery, No. 1, $14; Southern soft, No. 1, $11.50 to $11.75; Southern soft No. 2, $11.15 to $11.35; Lake Superior charcoal, $11.50.

J. H. CRAMER, M. E., of Cleveland, announces that the business of his laboratory will be conducted in future under the name of Cramer & Bicknell. Mr. Bicknell has been a special partner for a number of years, and the change is really in name only. Mr. Cramer's personal attention will be given to the work, as heretofore.

THE IRON TRADE REVIEW

DEVOTED TO IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES.

PUBLISHED EVERY THURSDAY BY
THE IRON TRADE REVIEW CO.,
CLEVELAND, OHIO.

CLEVELAND, 27 VINCENT STREET.
G. H. GARDNER, President. A. I. FINDLEY, Editor.

CHICAGO:
1142 MONADNOCK BLOCK.
B. M. GARDNER, Associate Editor and Western Manager.

PITTSBURG:
807 TRADESMEN'S BUILDING.
JAMES R. MILLS, JR., Manager.

Subscription (strictly in advance), $3 per annum. Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW, through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

MARCH 3, 1898.

MR. CARNEGIE'S SUGGESTION.

The communication from Mr. Carnegie, printed in another column, suggests a practical step toward the greatest desideratum in the industrial and commercial situation of the United States to-day. The points in it which are of far-reaching import to the iron industry of the Pittsburg and Lake districts are not only the possibilities of foreign trade in iron and steel, which it emphasizes, but the fact that the events of the past year, which have put Pittsburg so completely in command of steel-making economies, are to give the United States the long-lost key to prestige on the seas.

It will be noted that a prime factor in Mr. Carnegie's calculations is a freight of less than $1 a ton on finished steel from Pittsburg to New York, "since it will cost nothing to send steel to Conneaut in cars which otherwise must return to the lake empty for ore." In other words the control of an ore railroad gives the leading steel interest of Pittsburg a lake shore position so far as the shipment of its finished products is concerned. And $1 a ton or less from Pittsburg to New York means a clear advantage of $1.75 to $2 on prevailing rail rates for finished material. That is to say, steel can be delivered at British and Continental ports for less than is now charged for the haul from Pittsburg to the seaboard. To those who have had any skepticism as to the permanence of our foreign trade in iron and steel, the prospect presented by this statement should be in a high degree reassuring.

The New York shipyard suggestion ought to open the eyes of Empire State officials to the importance of liberal action on the pending proposals for Erie Canal improvement. It is most unfortunate that the public works department of the State should have descredited itself by the recent revision to $16,000,000 of the original estimates of 1895, which called for $9,000,000 for the improvement of the Erie, Oswego and Champlain canals. But it would be a grave mistake if in the effort to rebuke any incompetence or mismanagement that may have existed in the conduct of the work thus far, the vast benefits that will accrue to New York State and to the country from the deepening and widening of the Erie Canal, are overlooked or undervalued. With the work so far along, that it is estimated a channel with a uniform depth of 9 feet between Tonawanda and Albany will be available by 1899, and locks wide enough to permit of nearly 50 per cent increase in cargoes, with no increase in the present motive power of boats, it would be a grevious mistake to halt now.

What Mr. Carnegie says as to the great possibilities of a shipyard at New York, competing with the long established plants of England and the Continent, is entirely within bounds, in view of the achievements of the past 18 months at Pittsburg. What the Great Lakes have done for the country in the past decade in the marvelous cheapening of steel, suggests what may be done in a less degree by a larger use of water transport to the east, for the extension of our foreign market, under the low prices for all steel products that are bound to rule in the future. The one great lack, recognized on all hands, is the establishment of lines of American-owned and American-built vessels that shall free our foreign commerce from the hamperings of our competitors. As a step toward that end, a New York shipyard, with all the economies guaranteed by its location, is feasible and desirable. Capital with the courage and enterprise to seize the opportunity and aggressively to make the most of it, will reap its reward. Meantime, the State of New York should be alive to the large possibilities of the situation and deal with it promptly and wisely.

DIRECT METAL FOR CASTINGS.

Two lines of work have always fascinated experimenters in iron: Obtaining iron or steel direct from the ore, and making castings of all kinds with meted metal from the blast furnace. In both directions success has been attained to a degree, but in neither case has sufficient progress been made, nor were enough favorable conditions observed to warrant extended investment.

The paper discussed at the last meeting of the Western Foundrymen's Association, on the changes occurring during cupola melting gave occasion for an interesting editorial in last week's issue of *Engineering News*. The prediction is made that some day a blast furnace company will build a great foundry alongside of its furnaces, with mixers of 100 tons or more between, in which the metal can be chemically treated to desiliconize it, or to add manganese. Gas heated ladles are suggested, for treating small batches of the liquid metal for special purposes; and it is affirmed that hard or soft castings of any desired strength would be produced with a degree of uniformity not attainable in the cupola. When this day comes, it is rightly predicted, there will be a complete revolution in the foundry business. Will this day come? The question is one of some importance to foundrymen.

Castings have been made from the blast furnace direct, for many years, but of a kind which did not require the use of soft irons. They were not high in silicon, were heavy, required little or no machining, and there is no evidence that they were as strong as other castings of the same composition but made from remelted pig iron. The presumption is the other way, since investigators who have applied microscopy to the examination of pig iron say that mechanically mixed slag is usually present. It is a question if the holding of melted iron in 100 ton mixers would allow this slag to rise. Will the "kish" problem, recently discussed in our foundrymen's associations, be taken care of in the richer grades of foundry iron? Will the physical effect of closing up the structure of the iron, outside of that

produced by chemical changes, be obtained, equal to that now effected by the addition of stated proportions of scrap and remelting? It does not seem likely; and this alone would be a fatal objection. A bath of melted iron, say of 100 tons, held in mixers until thoroughly uniform—aside from the difficulty of finding out which it is in time for use—would behave, it has been suggested, somewhat like a "heat" in an open-hearth furnace just ready to tap. Metallurgists refer to the constant refining action going on in such a case—silicon and manganese being oxidized and slag forming constantly, so that the end of that 100 tons would be very different from the beginning, unless poured very quickly. There is the advantage that the metal is contaminated less with sulphur than is cupola iron, but when soft irons are made for the regular run of foundry work, it is doubtful if sound, strong castings could be obtained. When hard irons must be had for chilled work, the holding of 100 tons of this material would be a rather dangerous operation for the operators, if overheated; and equally so to the mixing furnace if too cold.

Only for that class of castings which in composition correspond to Bessemer iron, and in the interior of which the presence of mechanically mixed slag would do no harm as long as the surface was good, could the idea of a large mixer be carried out with some show of success. Ingot molds are of this class; but how car wheels or the frames of huge dynamos would fare, or jobbing work, and castings of a small size but in great quantity, is another question.

The cupola is by no means a scientific instrument for melting iron. Anyone who sees the flames belching forth from the stack quickly realizes this. Still the cupola is not as bad as usually represented, for such castings as air brake cylinders can be made day in and day out with great uniformity and perfect satisfaction. The cupola, too, makes it possible to produce various grades of work within short intervals of time. And accepting the common testimony as to the changes effected in melting the same mixtures in the various stages of a cupola heat, good management will turn them to the best account by a proper sequence in the pouring off of the molds.

The immense blast furnaces of to-day have probably reached the limit of size; immense converting and open-hearth plants alone can take care of their daily product. Furnaces making iron suitable for castings may well be kept within limits as to capacity; and if instead of adding a 100-ton mixer to a furnace a 5- or 10-ton mixing ladle be added to the cupola, a uniformity will be obtained much better for the purpose than ever could be with the plan suggested.

The idea of using gas heated ladles and treating small batches of iron chemically looks well enough, but might be very difficult to carry out successfully, not to speak of the cost of such operations. There is a lack of uniformity in the resulting mixture, the temperature necessary for perfect fluidity will be changed, and thus fluctuation, if upward, cannot be taken care of by the external heating quickly enough to allow a holding of the metal until the slag formed by the oxidation has risen. Again, manganese will never be added, as suggested, so far as our present knowledge goes; if anything, there will be too much present in the first place.

On the whole, if the editorial in question will deter intending investors from further overdoing the foundry business some good will result; but there need be no immediate fear of a revolution in foundry matters. In fact, the efforts of large corporations, in equipping foundries to make their own appliances, while sometimes cheapening them, have seldom been productive of as good results as obtained by founders of specialties.

MR. CARNEGIE ON OUR SHIPPING PROBLEM.

CANNES, FRANCE, February 10, 1898.

To the Editor of THE IRON TRADE REVIEW:

May I call attention, through your columns, to the field which is open for a first-class shipbuilding yard upon the Hudson, East River, or lower bay, near New York.

The prices paid for steel by British and German shipyards are so much higher than shipbuilders in New York would be required to pay that the difference would make, in itself, an excellent profit. Plates are worth about $22 or $23 per ton in New York. The quoted price at Glasgow is nearly $30. Other prices are in proportion and all the woodwork of ships is also much cheaper with us. If a yard were built to-day with the newest appliances, the total cost of labor, even at much higher wages, would be less than in any shipyard I know of, either in Britain or Germany.

I name near New York as the best for several reasons: 1. A shipyard there would get repair work, which is always profitable. 2. A drydock could be part of the equipment, which would also be highly profitable. 3. Two years hence the cost of transport upon steel delivered at the shipyard at New York from Pittsburg, the cheapest market for steel in the world, will not exceed $1 per ton, via Conneaut and the deepened Erie Canal. Indeed it will be less, since it will cost nothing to send steel to Conneaut in cars which otherwise must return to the Lake empty for ore. The present seaboard shipyards are so usefully occupied with domestic business that they cannot give foreign business proper attention. The New York yard should be constructed on a larger scale and with special reference to the foreign demand.

I am satisfied that the United States can readily regain the supremacy in shipbuilding it had when wooden ships were in vogue. It only needs an enterprising Western shipbuilding concern to establish a yard near New York and manage it with the skill and energy which have characterized those on the Lakes. This is the only prominent department of manufacturing in which our country is behind, and it is one in which it easily can obtain front rank. It would justify steel manufacturers to guarantee to such a shipbuilding concern a continuance of the present extremely low rates upon steel for a term of years, and also that steel of all kinds and armor and guns should always be furnished at the lowest price paid by European shipbuilders. But there is nothing to fear from the prices of steel, for these henceforth are to rule lower in our country than in any country of Europe. It will not be long before a large portion of its steel supply must be drawn by Europe from the United States.

If I were a younger man, or rather, if I did not belong to a concern so enterprising as to employ all my capital and give me a pleasurable occupation watching over its progress and success, I should be greatly inclined to enter upon the building of ships somewhere near New York Harbor. There would be no warships or Atlantic liners open for bids in any part of the world which the New York yard would not have something to say about. Every needed element is present for regaining our supremacy as the principal shipbuilding country. Surely some one of the successful Lake concerns will consider the advisability of establishing a branch yard near New York—a branch which I predict would very soon grow to many times the capacity of the original works, and give a much higher return upon capital, besides rendering its originator famous.

Very truly yours,

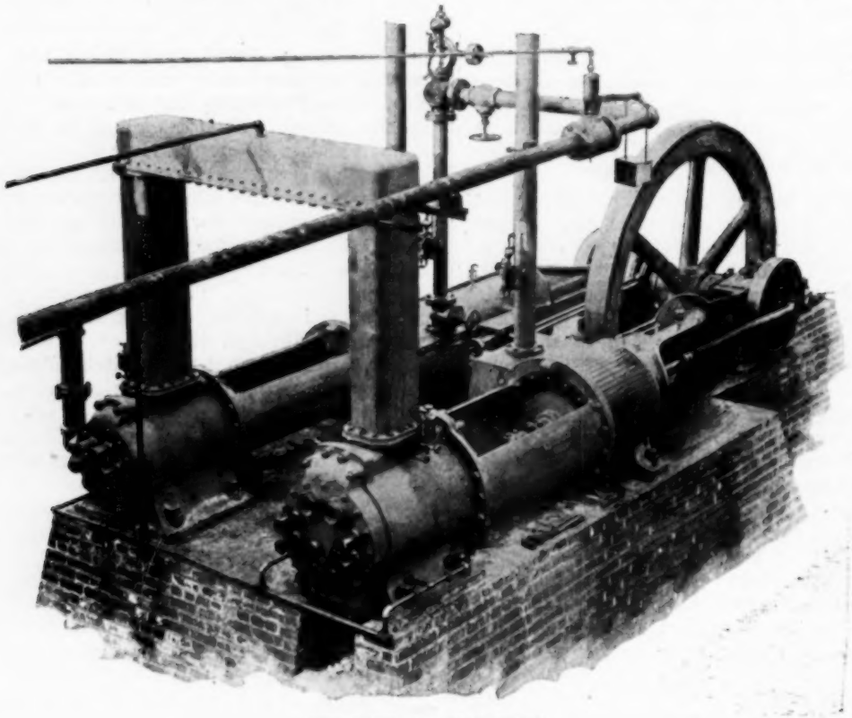
ANDREW CARNEGIE.

THE RAND AIR COMPRESSOR.

Mention was made last week in the description of the Cleveland Ship Building Co.'s plant at Lorain, of the air compressor installed by the Rand Drill Co., and supplying air to the extensive outfit of pneumatic tools provided in the main shop and in the yard of the company. The compressor, of which a view is given, is of the duplex type, having simple steam cylinders, 14 by 22 inches. The air cylinders are 22 by 14 inches, low pressure, and 14 by 22 inches, high pressure. The steam cylinders are fitted with Meyer adjustable cut-off valves, which permits the point of cut-off to be changed while the engine is in motion, allowing the machine to be run with wide open throttle and speed varied by the point of cut off. The machine is fitted with speed governor, which limits the speed in case of air pipes bursting. It is also fitted with an air regulator which adjusts the flow of steam into the steam chest according to the air pressure in the receiver. If the regulator is set for 80 lbs. air pressure, when this pressure has been reached in the air receiver the regulator throttles the steam, and as soon as air pressure is lowered the regulator opens and allows full steam pressure into the steam chest.

The air cylinders are cross-compound and between them is placed an inter-cooler through which the air passes from the low pressure to the high pressure cylinder and is taken into the high pressure cylinder at or below initial temperature. By compounding the air ends with sufficient cooling surface, it is possible to gain from 10 to 20 per cent in economy. The air cylinders are water jacketed. The air valves are of the Rand standard type, generally known as poppet valves. The Rand Drill Co. also builds several other types of air valves but for general use and particularly for compressors that are to be run at high speeds, the poppet valve has proved itself most durable and efficient.

Among the uses to which air is put at the Cleveland Ship Building Co., are the following: Driving rivets on the frame work of ships and flush rivets on plates; reaming holes for rivets; chipping and caulking seams; operating air hoists; supplying pneumatic hydraulic stationary riveters; doing dry dock repair work; drilling out countersunk rivet heads to enable them to back out old rivets. The portable drilling is also done by air.



THE RAND AIR COMPRESSOR.

THE wage dispute at the Reeves Iron Co.'s mill, Canal Dover, O., has been settled by the company agreeing to pay the regular tin mill wage scale for sheet iron rolled in the tin mill.

RECEIVED FROM THE TRADE.

A recent leaflet of the Harrison Safety Boiler Works, of Philadelphia, calls attention to a way of getting a spare boiler when the money cannot be spent for the new equipment or there is not space enough for its installation. The method suggested in the leaflet is to feed hot water to the boilers now in use—water at the temperature of exhaust steam, and to make this water pure, so that it will not leave a coating of impurities on the heating surface of a boiler. More in detail is told about the use of Cochrane heaters to accomplish these results.

"Cambria Steel Rails" is the title of two flat volumes bound in red cloth, just issued by the Cambria Iron Co., Johnstown, Pa. They are respectively 8x11 inches and 11x12 inches in size. In Vol. 1 are given details and diagrams of the various weights and sections of Cambria T-rails, and details of the track supplies manufactured at Johnstown, with tables of useful information concerning the tonnage and weights of the various forms of track materials. Vol. 2 is devoted to girder rails for street and electric use; and in connection with the various sections and weights of these rails the names of railroads using each style are given. The sections shown and the quality of the rails furnished are the evolution of 43 years in rail manufacture under the present management, and the record made by the company in that time is one calculated to sustain the claims made in the volumes before us.

The Edward P. Allis Co. sends out a souvenir that is significant of noteworthy achievement. It is a disc of cast iron about the size of a silver dollar, but two or three times as thick, and it commemorates the first cast in November, 1897, from the new furnaces of the Krainische Industrie Gesellschaft, Trieste, Austria. On one side is the name of the furnace company; on the other is the inscription, "Erster Abstich, November, 1897," surrounding the crossed pick and hammer. The significance of the medals is in the fact that the iron of which they are made is the first cast in Europe after the introduction of American blowing engines. The furnaces at Triest are driven by two compound blowing engines furnished by the Edward P. Allis Co. The steam cylinders are 40 and 78 by 60 inches and the air cylinders 76 by 60 inches.

A pocket pamphlet published by the Ingersoll-Sergeant Drill Co., with the title "Air Compressors" gives half-tone illustrations of the various types of the company's air compressors, as used by railroads, mines, water works, quarries and by manufacturers in various lines, for the driving of tools. These compressors are steam and belt driven, straight line and duplex, simple or compound, with intercoolers and water circulation all around the cylinders and through the heads. Thorough and automatic regulation of air pressure and speed is secured.

BESSEMER STEEL PRODUCTION IN 1897.

The American Iron and Steel Association has just published the statistics of the production of Bessemer steel ingots and Bessemer steel rails in the United States in 1897. The figures do not include the comparatively small quantity of standard rails and street rails which were made by manufacturers from purchased blooms or were rerolled from old steel rails. In the statistics of ingots produced are included the production of the few Clapp-Griffiths and Robert-Bessemer plants, and also the production of steel castings by all Bessemer works:

Ingots.—The total production of Bessemer steel ingots in 1897 was 5,475,315 gross tons, against 3,919,906 tons in 1896, showing an increase in 1897 of 1,555,409 tons, or over 39 per cent. The production of 1897 was much the largest in our history. The following table gives our production of Bessemer steel ingots in the last six years:

Years. Gross tons.	Bessemer ingots.	Years. Gross tons.	Bessemer ingots.
1892	4,168,435	1895	4,909,128
1893	3,215,686	1896	3,919,906
1894	3,571,313	1897	5,475,315

The following table gives the production of Bessemer steel ingots by States since 1894:

States—Ingots.	1894. Gross tons.	1895. Gross tons.	1896. Gross tons.	1897. Gross tons.
Pennsylvania	2,334,548	2,978,924	2,292,814	3,060,049
Ohio	363,974	719,954	568,535	1,041,541
Other States	872,791	1,210,250	1,058,557	1,373,725
Total	3,571,313	4,909,128	3,919,906	5,475,315

Rails.—The production of all kinds of Bessemer steel rails by the producers of Bessemer steel ingots in 1897 was 1,614,399 gross tons, against a similar production of 1,102,892 tons in 1896, 1,266,081 tons in 1895, 904,020 tons in 1894, 1,036,353 tons in 1893, and 1,458,732 tons in 1892. The maximum production of Bessemer steel rails by the producers of Bessemer steel ingots was reached in 1887, when 2,044,819 tons were made. The following table shows the production by States of Bessemer steel rails by the producers of Bessemer steel ingots in 1894, 1895, 1896, and 1897:

States—Rails.	1894. Gross tons	1895. Gross tons.	1896. Gross tons.	1897. Gross tons.
Pennsylvania	606,866	837,043	663,096	1,024,386
Other States	297,154	429,038	439,796	590,013
Total	904,020	1,266,081	1,102,892	1,614,399

At the request of the steel rail manufacturers, General Manager Swank has separated this year for the first time, the production of Bessemer steel rails weighing 45 pounds and less than 85 pounds to the yard from those weighing less than 45 pounds and over 85 pounds. The production in 1897 was as follows:

States—Rails.	Under 45 pounds. Gross tons.	45 pounds and less than 85. Gross tons.	85 pounds and over. Gross tons	Total, Gross tons.
Pennsylvania	51,286	708,475	264,625	1,024,386
Other States	33,831	485,296	70,886	590,013
Total	85,117	1,193,771	335,511	1,614,399

THE illumination of the grounds and buildings of the great exposition for which Omaha is now preparing will be made on a scale of magnificence equal to the effects obtained at Chicago in 1893. Luther Stieringer, the lighting expert of the World's Fair, is consulting electrician for the Omaha Exposition Co. Already 2,155 kilowatts in dynamos and transformers have been ordered from the General Electric Co., for illuminating purposes.

MAJOR MALCOLM McDOWELL.

One of the veteran foundrymen and iron workers of the West is Maj. Malcolm McDowell, whose portrait we have the pleasure of giving to our readers. Maj. McDowell's work as a writer on foundry matters has attracted attention, and has been of great interest and value to the trade. In recognition of this service the Western Foundrymen's Association at its last meeting made him an honorary member.

Major McDowell has been identified with the iron and steel business most of his life Before the war he was with the Troy Iron & Nail Factory, now operated under the name of the Burden Iron Works, by the Burden Iron Co. He was with this concern for nine years. He went through the war as major in the pay department, serving throughout the war on the staff of his brother, Major-General Irving McDowell. In 1870 Maj. McDowell went to Chicago to take charge of the Union Forge & Bolt Works. After the fire he was actively interested in building the Chicago Steel Works. While with this concern he devised the method of using the fag end of steel rails in making agricultural implement shapes, and invented the steel plow beam. The Major also invented the

steel wheel for agricultural implements, made of the fag end of steel rails. Later he built a splice bar mill for making the Samson splice bar.

Some years ago Maj. McDowell went into the foundry business with his son, Gordon McDowell, devoting his time to making special metals for casting, and general improvements in casting iron and steel. While in this business he developed an improved process for making castings from cupola-melted metal, known as the McDowell semi-steel process, which is now in use in many of the largest plants in this country, and is meeting with much success.

Maj. McDowell's talks before the foundrymen's associations have been very interesting, as he has an attractive way of putting things. His personality is such that he makes friends easily, and the friendships made are retained.

ALFONSO VERNIMMEN, representing the Valdez sugar producers and manufacturers of Guyaquil, Ecuador, is in Pittsburg to make contracts for machinery and for building materials. The fire of 18 months ago destroyed three-fourths of Guyaquil, and many factories, warehouses and other buildings will be replaced with steel structures. Mr. Vernimmen finds Pittsburg prices of iron and steel low as compared with European quotations. If freight rates can be made satisfactory, Pittsburg will get much of the business. He suggests that special low rates should be given Pittsburg on export business. He adds: "For want of proper transportation facilities, the United States is allowing England and Germany to carry off a valuable trade that properly belongs to this country. I find that the conditions of manufacture here, in spite of higher wages, are more economical than in Europe, and with adequate steamboat connections with our ports this country would have no difficulty in securing and holding the trade."

PITTSBURG FOUNDRYMEN'S ASSOCIATION.

Twenty-nine members attended the February meeting of the Pittsburg Foundrymen's Association, Monday evening, Feb. 28, at the Builders' Exchange, Pittsburg. They were: President Robert Taylor and W. T. Mobberley, Taylor, Wilson & Co.; Secretary F. H. Zimmers, Union Foundry & Machine Co.; J. S. Seaman, Seaman-Sleeth Co.; Wm. Yagle, Wm. Yagle & Co.; Dr. Richard Moldenke, McConway & Torley Co.; Isaac W. Frank, Frank-Kneeland Machine Co.; Charles Bailey, Reliance Steel Casting Co.; Chas. W. Friend, Clinton Iron & Steel Co.; James Scott, Lucy Furnaces of the Carnegie Steel Co., Ltd.; Jno. R. Darragh, Isabella Furnaces; E. A. Uehling, of the Uehling Method of Casting and Conveying Metals; A. D. Hasbrouck, Johnson Co., Johnstown, Pa.; Phillip Mathes, Brittain & Mathes Co.; David L. Evans, Rosedale Foundry Co.; James W. McClure and J. B. Pearson, Geo. W. McClure & Son; Thos. Christian, Dawes & Myler, New Brighton, Pa.; James McDonald and B. D. Fuller, Westinghouse Electric & Mfg. Co.; Elliot A. Kebler, Matthew Addy & Co.; James Altsman, James Collord; Jno. A. Meighan, Dawson Bros. & Meighan; Samuel W. Hay, Whiting Fdy. Co.; Jno. R. Gilmour, Hydraulic Machine Co.; Thos. Robinson, Robinson Machine Co., Monongahela, Pa; Jas. R. Mills, Jr., *The Iron Trade Review.*

E. A. Uhling read before the association the paper printed elsewhere in this issue on "Sandless Pig Iron." A general discussion followed the reading and experiences were given of various foundries on points touched in the paper. All tended to the conclusion that the grain of the iron, where produced by external causes,—chilling, rate of cooling or any mechanical phenomenon—was no standard by which to judge the qualities of the iron. There was no dissent from the view that the custom of judging iron by fracture must give way to the certainties of a chemical analysis. A vote of thanks was tendered Mr. Uehling. At the next meeting, Mr. Chas. W. Friend, of the Clinton Iron & Steel Co., will read a paper on "Foundry Iron."

Carnegie Steel Co. Buys Carrie Furnaces.

The entire property of the Carrie Furnace Co., at Rankin, Pa., which, in addition to the furnaces proper, includes a block of coke ovens has just been purchased by the Carnegie Steel Co., Ltd. It is understood that the new owners will take possession May 1. On the 30th of September last, Furnace No. 2 of the Carrie Furnace Co. was blown in as a practically new stack. During the summer four stoves had been raised from 65 to 85 feet, a new hearth added and the tuyeres increased from 8 to 12. To Furnace No. 1, which was rebuilt in 1893, was added last summer two Massicks & Crookes stoves 19½x85 feet. A Uehling machine for casting and conveying metals completed the additions and changes that made the plant efficient in every particular.

Rankin is directly opposite Homestead on the Monongahela River and the present intention of the purchasers is to use the Carrie output at the Homestead Steel Works. Whether the river transfer can be made by means of private transport or will require a bridge at this point, is a question for the future. Equally convenient, however, are the Edgar Thomson Steel Works located a little more than a mile above Rankin and from which at the present time a track of the Union Railway is extended to within a short distance of the newly acquired furnaces.

The daily output of each stack is about 300 tons which from time to time will probably be increased by the addition of advanced furnace equipment. With the acquisition of the Carrie Furnaces the Carnegie Steel Co. owns 17 out of 30 blast furnaces in Allegheny County and increases its production to nearly 85 per cent of the total output of the Pittsburg district.

Personal.

Geo. L. Crawford, assistant to Superintendent D. G. Kerr, of the Edgar Thomson Furnaces, of the Carnegie Steel Co., Ltd., has resigned to accept a similar position at the Monongahela Furnaces of the National Tube Works Co., at McKeesport.

President James N. Reed, of the Pittsburg, Bessemer & Lake Erie Railroad is in Florida.

Alfred A. Jones, of Leicester, Eng., and Herman A. Brassert, of Frieberg, Germany, are visiting iron and steel plants of Pittsburg and the valleys.

Chas. Kirchhoff, editor of the *Iron Age*, was elected president of the American Institute of Mining Engineers at the recent meeting at Atlantic City. The other officers are as follows: Vice presidents, E. D. Peters, Jr., Dorchester, Mass.; A. R. Ledoux, New York; Leon P. Feustman, Mexico; managers, W. B. Devereaux, Glenwood Springs, Colo.; W. J. Olcott, Duluth; R. P. Rothwell, New York; treasurer, Theodore D. Rand Philadelphia; secretary, Dr. R. W. Raymond, New York.

E. W. Parker, for the past year editor of the *American Manufacturer*, has resigned the position to devote himself entirely to the important statistical work for the Mineral Resources Division of the United States Geological Survey, which he has done so well for a number of years.

Henry Knoth has been appointed superintendent of the plant of the Burgess Iron & Steel Co., Portsmouth, O.

John A. Donaldson, president of the Mertes Mfg. Co., manufacturers of gears and pinions, in Allegheny, died last week.

Industrial Notes.

The Davis & Egan Machine Tool Co., of Cincinnati, has ordered from the Pond Machine Tool Co., of Plainfield, N. J., one of that company's latest pattern 72-inch square planers, with four heads, and 40-foot table. This will be one of the longest planers running in this country. It will be installed in the new plant at Covington, Ky.

Reports regarding the West Virginia Bridge Works, which recently assigned at Charlestown, W. Va., are calculated to confuse that company with the Virginia Bridge & Iron Co., of Roanoke, Va., owing to similarity of names. The Virginia Bridge & Iron Co. is enjoying prosperity.

Dietz, Schumacher & Boye, of Cincinnati, builders of machine tools, are now located in their new factory, corner of Queen City ave. and Buck st.

The Heilman Machine Works, Evansville, Ind., is working on a big Corliss engine, to weigh 120 tons. Five cars will be required to ship it to its destination—the Midland Steel Works, Muncie, Ind.

The Otis Steel Co., Cleveland, has received instructions from Washington to proceed at once with the construction of four naval gun carriages. They are the mounts for 10-inch guns.

The Walker Co., Cleveland, has taken a large contract for electrical equipment for the Brooklyn Elevated Railway. The three-rail system will be used.

The improvements at the Isabella Furnace Co.'s plant involve a large expenditure. When they are completed, the furnaces will be practically rebuilt.

The American Tube & Iron Co. has shipped recently from its Middletown, Pa., plant a considerable tonnage of iron trolley poles to Colombo, Ceylon, and to the British Isles.

The Antrim Iron Co., Mancelona, Mich., put its charcoal furnace in blast after extensive repairs.

THE contract for cast iron pipe for the city of Cleveland has been held up, though the original report of the board of control recommended that the bid of the Addyston Pipe & Steel Co.—$16.73 for pipe delivered on streets—be accepted. The Lake Shore Foundry Co., of Cleveland, has been working up sentiment on the "employment of home labor" basis, though its bid was $17.45, or 72 cents more than that of the Addyston Co. At a meeting of a city council committee Monday, Feb. 28, there were several passages between representatives of the two pipe companies. The committee seems divided, but there is now some talk of readvertising so that the local company can put its figures down. The affair is an illustration of the fast-and-loose method in the conduct of municipal business. After years of twisting and squirming under what they have called the exorbitant charges of the pipe pool, in referring to the bids of the local company, the officials of Cleveland now seem to be seriously considering a proposition to juggle with the bid of an outside concern, made in good faith, and that if accepted would save the city several thousand dollars over any pipe contract it has ever placed at home. A city that uses outside bids merely as foils can scarcely complain if manufacturers in other cities learn to leave it to the mercy of a single bidder.

Review of the Technical Press.

[Translations, Condensation and Comment expressly for The Iron Trade Review by Dr. Richard Moldenke.]

Utilization of Blast Furnace Gases. [*Engineering and Mining Journal*, Feb. 19th.]—In an editorial on this subject the next great step forward in the economy of the blast furnace is touched upon briefly. Reference is made to the use of blast furnace gases for power purposes by a direct application in gas engines, instead of the old way of firing boilers to obtain steam for the blowing engines, hoists, etc. The experience of Mr. W. Galbraith, of Wishaw, Scotland, is quoted. He uses raw coal for fuel, the surplus gas from the stacks is collected, purified, and stored in holders. In his particular case the electric lighting plant is run, but 15 or 16 h. p. being required for this purpose. The results obtained with this comparatively poor gas are equivalent to 1.54 to 1.65 lb. of coal in the furnace per hour for 1 h. p. A calculation of the wastage of power at the Wishaw furnaces through the escape of surplus gas foots up to 1,800 h. p. Other plants show similar figures, in one case a furnace utilized 150 h. p. The editor states further that after providing for the stoves, etc., the surplus gas should be utilized in gas engines to furnish power for an electric plant. By means of motors this could run blowing engines, cranes, hoists, and other machines common about the blast furnace. The reviewer would point out that the very first and best use of waste gas is said to be to run the blowing engines direct as gas engines, similar to the steam air compressor, and by dividing up the blowing system into suitable units, a greater flexibility is obtained, the chances of breakdowns is lessened, and more regularity in the pressure of the blast will result. The editor concludes by calling attention to the waste of value money in the present methods of disposing of the slag, and rightly states that although we are now making iron at a smaller cost than any one else in the world, yet others are on the lookout for directions to beat us in, and we should not let go a single opportunity to reduce the cost of production and make a corresponding profit.

Wire and Wire Rope under Repeated Bending Stresses [*Baumaterialienkunde*, 9 to 13.]—Extracts from the report of Professor Rudeloff on the above subject are given, the data obtained being the result of an investigation of the endurance of wire ropes under the repeated bending stresses encountered when passing over shears. The series of tests were made at the instance of the Minister of Public Works of Prussia. Four kinds of wire were used, each .08 inch thick, and with a specified tensile strength of 54,000, 71,000, 114,000, and, 170,000 lbs. per square inch. A variety of combinations were made with the wires as strands for the rope, and the following was the range of tests they were subjected to: With the wires alone the tensile strength, bending strength on a circle of ½-inch radius, twisting strength with grips 6 inches apart, and finally continuous bending tests, under strain, over circles of various radii. The wire ropes (made without cores) were tested for tensile strength and resistance to continuous bending only. The tensile tests were conducted very carefully, increasing loads being put on, and the corresponding elongation determined each time. The continuous bending tests were made in a machine specially constructed for the purpose in which the wires and ropes were held under tension by means of heavy weights, and the oscillating motion of arms with carefully rounded ends caused the wires to bend over these curved surfaces alternately one way and then the other. From the coil of wire of each kind a dozen sets of tests were made, so that the average result may be considered typical of the material. A marked regularity was found to exist in the four kinds of wire so far as tensile strength, elongation, etc., is concerned. In the twisting tests only two wires, the weakest and the strongest, gave uniform results, the other two acted very erratic. Two hundred and sixty-four continuous bending tests were carried out with a variety of loads on the wires, and over circles of various radii. The data are tabulated and plotted graphically, giving a series of curves which may be interpreted as follows: The resistance of wires to repeated bending stresses for the same radius of curvature, and under an increasing load, at first decreases rapidly, then as the load becomes greater the resistance decreases more slowly. The resistance decreases faster with an increasing load, the greater the ductility of the material. With the same load on the wires the number of repetitions of the bending process the metal will stand increases with the radius of the circle the wire is bent over, the increase being slow at first, but becoming more rapid as the circle grows larger. The influence of the tensile strength of a wire upon its ability to stand repeated bending stresses is shown by the fact that with the same radius of the bend, and at the elastic limit of each material, the resistance at first is lowered as the elastic limit goes up, but afterwards rises rapidly when 85–100,000 lbs. per square inch in reached. The next investigation made was to determine the influence of the elastic limit of the material and the radius of curvature used upon the behavior of the wires when under repeated bending stresses. Interesting tables give the data in a compact form, and these further plotted in sections, with the number of bending strokes for the vertical, the elastic limit and the radius of curvature of the bends for the horizontal components, give a very graphical representation of the behavior of the wires. This is reproduced in the shape of a wooden model, photographed and illustrated in the paper. It would seem then that for a tension of 3–12,000 lbs. the law of the relation of elastic limit and the radius of curvature to the number of repeated bending stresses, can be represented by a surface of double curvature. That the bending capacity of all the wires rises with the radius of curvature, especially when the strain they are under is decreased. With the same radius of curvature the influence of the elastic limit of a metal is more marked when light loads are used than with heavier ones. To explain the behavior of the wires under the various tests Professor Rudeloff further states that in bending them to the given circles there must be a stretching of the wire and a consequent elongation. A calculation of the actual length of the outer side of the wire after stretching, shows that the elastic limit was overstepped considerably for the softer varieties, and less so for the harder ones. Indeed, this is proven by the fact that every wire when bent by hand over a circle with a radius of 8 inches shows a permanent deformation. Now, it is well known that when the elastic limit of a material is overstepped that its toughness is diminished proportionally. The continuous application of bending stresses will therefore finally destroy all the toughness of the material. As the hard wires in these tests stood up better than the soft ones, the inference is made that wire rope of soft steel would wear out before that made of harder and stiffer steel. This is actually the case in practice. The experiments, however, do not carry this phase of the investigation to a logical conclusion, as the strongest kind of wires were not studied. Trials of wire rope were now made, tables of their tensile strength being given first. The conclusions reached were that with all the kinds of wire tested, and with all the kinds of wire rope twisted from them, the closest twist gave the least strength. As the spirals of the ropes were lengthened the strength went up. The best results for the softest wire ropes were found when the length of a complete turn of the spiral was from .8 to 1.2 inches. A comparison of the strength of wire ropes with that of the original wires they were made from now follows, the conclusions derived being that in the case of these high carbon samples the primary strength was not obtained, being behind in this respect even in the rope with the longest spiral; with the shortest spiral the loss is actually 32–44 per cent. In the case of the softer wire the strength of the rope seems generally to be larger than that of the original wire, varying from 1–2 per cent below to 13 per cent above. Continuous bending tests with wire ropes are now taken up, the results found being similar to those obtained from the original wires, the effect of the rope construction seems, however, to follow no law, when taken in connection with the number of repeated bending stresses they could be subjected to without breaking. The conclusions derived from these tests is that the resistance of wire ropes to bending is much smaller than that of the single wires collectively, and that the endurance of wire rope, while under a tension equal to one-tenth of their breaking strength, and subjected to bending stresses, becomes proportionately greater as the ultimate strength of the material goes up. A series of tests was also made with wire rope which had worn out in service but no results are noted. Finally the observation is made that deterioration in a wire rope under uniform service conditions is to be looked for specially in the lower end, and that a hoisting rope for instance may be considered safe if samples cut from the lower end show satisfactory results.

MECHANICAL DRAFT.

A valuable contribution to the literature of induced draft has been made by the B. F. Sturtevant Co., Boston, whose engineers have recently prepared an imposing 8vo volume of 385 pages, under the title "Mechanical Draft." It is called a "practical treatise," and such it is; at the same time it goes thoroughly into the subject on its theoretical side, and the principles of combustion and of boiler practice, in the light of the most recent experiment and experience are set forth in detail. The authors start out with the proposition than "hereafter the progressive engineer will not adopt the chimney as the sole means of draft production, but will first carefully consider the respective advantages of the chimney and the fan, for the claims of the latter to superiority cannot be disregarded." There are two divisions of the work: The first a discussion of the general subject of mechanical draft; the second a demonstration, by chapters of actual experience, of the adaptability of the Sturtevant fans to this work.

Some estimates are given in the book, of the economies possible with the use of mechanical draft. One example taken is a plant of eight modern water-tube boilers, each of 200 h. p. nominal rating, set in pairs making a total of 1,600 h. p. A chimney is provided, 8 feet in internal diameter by 180 feet high, of sufficient capacity to overcome the resistance of economizers and produce the draft necessary for any probable forcing of the boilers. Two feed-water economizers are used, through which or around which the gases pass on their way to the chimney. The boilers and economizers are inclosed in an independent boiler house, outside which is the chimney. The detailed cost of this portion of the plant is put at the following:

8 water-tube boilers of 200 horse-power each	$25,000.00
2 feed-water economizers	7,000.00
Boiler and economizer setting and by-pass	6,000.00
Automatic damper regulator and dampers	300.00
Chimney, complete	9,000.00
Building, complete	11,000.00
	$58,300.00

Apparatus of the induced type to take the place of the chimney would consist of two steel-plate fans, side by side, each driven by a double-cylindered upright engine. Each fan is capable of producing independently the draft for the entire plant, and the duplex arrangement is not necessary except where the work required is practically continuous and where any delay from possible accident would cause great inconvenience. The fans and engines are put on top of the economizers. By an arrangement of dampers in the inlet connection between the fans, the hot gases drawn from the space beneath may be made to pass through either of the two fans while access may be had to the interior of the other without inconvenience from the heat. By means of a special form of draft regulator, the fans are kept continuously in operation at just the speed necessary to produce the draft that, with differing conditions of the fire, will maintain the steam pressure constant. Such an apparatus, with duplicate engines and fans, its automatic regulation and short stack, can be installed complete for about $3,500. This as against $9,300 for chimney and damper regulator in the above, means a saving of $5,800. Further saving could be secured by designing the plant to operate the boilers at somewhat above their rated capacity. Bringing the rated capacity down to 1,400 h. p. would mean a further saving of $4,125—$3,125 in cost of boilers, $500 in cost of settings and $500 in cost of building. Making allowance for the cost of land occupied by the chimney, at $2 a square foot, and saving in land space by reducing the number of boilers, would add $1,950 to the saving account, making a total of $11,875 on such a plant as that indicated in the table above. Commenting on this, the authors of the volume say: "The reduction of $11,875 in the cost would indicate an annual saving in fixed charges of about $831 to $890, according as the aggregate of interest, taxes and insurance is taken at 7 or 7½ per cent. This amount would, under conditions of the best economy, be practically sufficient to cover the cost of operating the mechanical draft apparatus, provided no attempt was made to utilize the exhaust steam. When to this is added the increased convenience of mechanical draft, its positive character, its ready adaptability, its independence of climatic conditions, and its instant response to any demand for increased steam supply, the account stands decidedly to its credit. Therefore any further saving, as for instance in the cost of the fuel burned, is clear gain over and above any expenditure which may have been made on account of the introduction of this method."

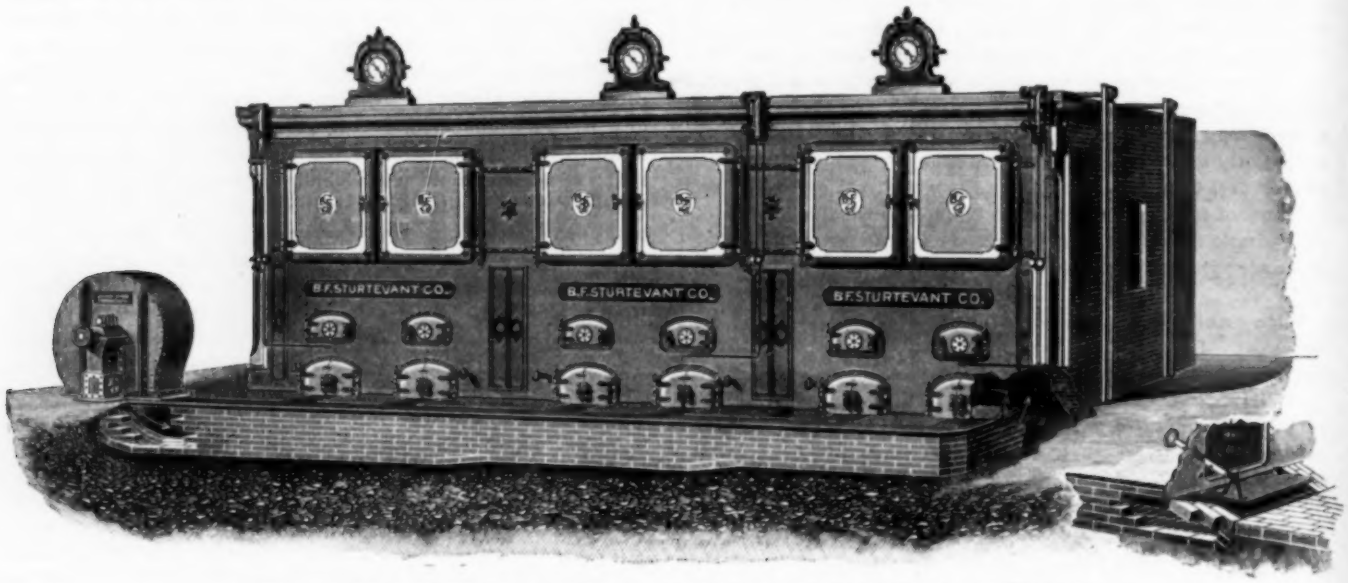


FIG. 1.—TYPICAL ARRANGEMENT OF STURTEVANT FAN FOR UNDER-GRATE FORCED DRAFT.

We have taken from the volume the description given below of a typical arrangement of the Sturtevant steam fan for the production of under-grate forced draft:

In Fig. 1 is presented one of the simplest arrangements of a mechanical draft plant. The fan, which is of the steel-plate pattern, with angular downward discharge, is driven by a direct-connected enclosed double upright engine. The air is discharged through the entire open bottom into the underground brick duct extending along the front of the battery of boilers. From this duct, smaller branches, two to each boiler, extend to the ashpits, to which the air is admitted in the requisite amount through ashpit dampers of the type shown in Fig. 2. There is thus maintained within the ducts and ashpits a pressure greater than that of the atmosphere by an amount dependent upon the speed of the fan, which may be regulated at will. If convenient, in such an arrangement, the main duct can be carried immediately beneath the boilers or at any desirable distance in front of them. The fan may be as readily placed in any other position than that shown, and, in case floor space in not available, may be located on top of the boilers and arranged to discharge directly downward into the underground duct. In fact, the possible arrangements are almost without number, for the fan may be of any type, driven by direct connected engine or electric motor, or by belt from an independent engine, or from a line shaft, and may be located in any convenient position.

The success of an under-grate system of forced draft depends largely upon the method adopted for admitting the air

to and distributing it within the ashpit. Under ordinary conditions it will not do to admit it through the bottom and allow it to be forced directly upward against the grates. It must first be so deflected as to move upward in substantially equal volume at all parts of the grate. To accomplish this result the form of damper shown in Fig. 2 is employed. As here shown, it is placed in the sloping front of the ashpit bottom and consists of a frame thoroughly imbedded in the brickwork, a door hinged thereto and a handle bar for operating it. The door is countersunk in the frame so that when closed the top is perfectly flush and the ashes may be readily raked over it. The handle bar is notched so as to permit of adjustment to suit the conditions. In the form here shown the arrangement is readily applicable to an old boiler, for the ducts may be easily constructed without affecting the boiler setting, and

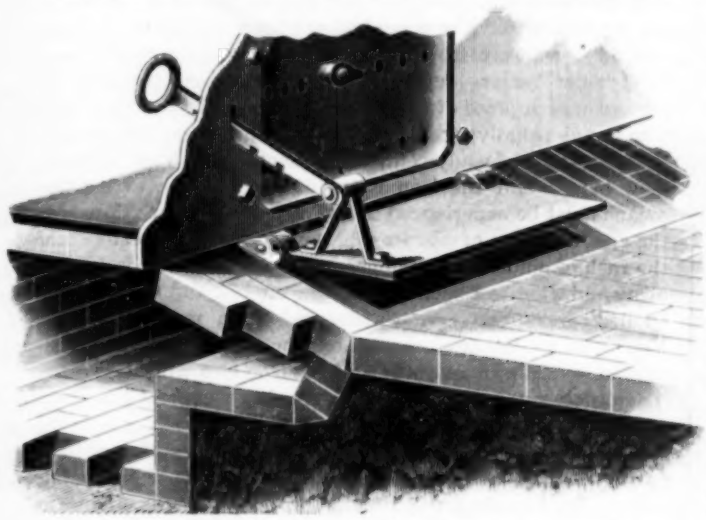


FIG. 2.—STURTEVANT ASHPIT DAMPER IN BOTTOM OF ASHPIT.

the handle bar may be introduced through a single opening which may be readily made in the boiler front.

When the mechanical draft plant forms a part of the original installation, that is, when the use of mechanical draft is decided upon before the boilers are erected, the type and arrangement of ashpit damper shown in Fig. 3 is convenient. The air duct is in this case constructed within the bridge wall, and the dampers (one or more to each boiler) are placed as shown. Each damper is provided with an extended shaft and lever so that it may be operated from the boiler front by means of the long handle bar. This is placed at the side, so as not to interfere with the doors. As the air leaves the duct and passes through the damper it is turned

FIG. 3.—STURTEVANT ASHPIT DAMPER IN BRIDGE WALL.

downward. It spreads over the entire bottom of the ashpit, thence rising in an even volume at low velocity to the grate above. All possibility of local air blast upon the grate is thus avoided, and the combustion is greatly accelerated, but maintained perfectly regular.

The proper arrangements for admission and distribution of the air are important, for upon them practically depends the success of the system. By the introduction of reasonably large ducts and branches the velocity can be kept sufficiently low to prevent its direct impingement upon any portion of the grate when it escapes from the provided opening into the ashpit. The adjustable feature of the damper, together with any device which may be provided for proportioning the speed of the fan to the draft requirements, makes it possible to absolutely control the air supply and draft pressure.

COOLGARDIE'S 90,000-TON PIPE LINE.

Two articles of special interest to engineers have just appeared in the *Engineering News*, descriptive of the plans proposed by English engineers for a water supply for the Coolgardie mining district in Western Australia. American engineers and contractors are to compete with those of England, should the scheme be carried out, and the steel works of the United States are interested in the enormous tonnage of riveted steel pipe that will be taken.

"Briefly stated, the engineering problem presented is the delivery of a supply of water, amounting to 5,000,000 gallons per day, to the arid gold mining district in Western Australia. This water is to be taken from a storage reservoir on the Helena River, in the mountainous district near the coast where rainfall is abundant, and it is to be delivered into reservoirs at Coolgardie, 328 miles distant, and at an elevation 1,330 ft. above the level of the reservoir from which the supply is taken. The water, of course, must be forced through the pipe and up this elevation by pumping; and as coal, delivered at the pumping stations along the pipe line is estimated to cost on the average $7.68 per ton, it is an object to reduce the frictional head as much as possible, and to adopt economical pumping engines. In general, the plan proposed is to divide the pipe line into a number of sections, with a reservoir and pumping station at each section. In this manner the pipe line is nowhere subjected to a pressure greater than is frequently reached in ordinary water-works practice. * * *

"It would probably be inadvisable to use wood pipe for the parts of the line subjected to heaviest pressure; and American practice, as our readers well know, is to use steel pipe where the head is over 100 ft. or so. The Coolgardie pipe line, as planned, however, consists of a series of steep lifts at each pumping station, followed by a long down grade to the next pumping station, and an examination of the profile in our last issue will show that three-fourths or more of the line is under no pressure which would interfere with the use of wood pipe. The saving in cost which would result from the substitution of wood stave pipe for three quarters of the line we shall not attempt to estimate; but we believe it is well worth looking into.

"The published estimate for the whole enterprise is the very considerable sum of $12,500,000 Roughly speaking, the works to be built for this sum consist of the pipe line, 328 miles in length, pumping machinery to the amount of 3,000 h. p., nine pumping stations with small reservoirs at each, and one large dam and storage reservoir at the source of supply. Our readers who are familiar with the cost of such construction can compute for themselves and form their own opinions as to what saving could be made by the use of wood pipe. The published estimate of the cost of the steel pipe, laid, is $9,150,000 The quantity is estimated at 90,000 tons.

"Our latest information is that the West Australian Government has not yet been able to float the large bond issue which it offered to raise funds for this work at the rate of interest which the colony was willing to pay; and matters are consequently at a standstill. Under these circumstances the colonial officers, if they desire to carry out their great enterprise, would do well to turn toward this country for aid. It is by no means impossible that they can obtain plans and advice here which will enable them to carry out their scheme at a saving of millions of dollars compared with the plans proposed by the English engineers, and at the same time to utilize in the work to a large extent their own home labor and materials."

NOTWITHSTANDING the unusual activity which followed the settlement of the engineer's strike in Great Britain, the prices of pig iron are somewhat lower than a year ago. The latest quotations we have are $12.50 (50s.) per ton for Bessemer pig, against $12.72 at the even date in 1897; $10 96 for Scotch pig, against $11 38; $9.75 for Middlesboro pig, against $9.84. It is of interest to compare these quotations with our own of parallel date; and we find that they were $9.75 for Bessemer pig, and $8 75 for mill iron at Pittsburg, while No. 1 Alabama foundry sold for $7.50 at Birmingham. Our prices are considerably lower, the greatest difference being $2.75 on Bessemer.—[Engineering and Mining Journal.

ADVANTAGES OF SANDLESS PIG IRON.*

BY E. A. UEHLING.

As an introduction to my paper, as well as of myself to this Association, it may not be amiss to state that the writer is not a foundryman, but a blast furnaceman. For this reason I feel that I will have your kind indulgence if I state briefly the causes that led to the perfecting of a machine capable of taking care of the output of a modern blast furnace. You will further bear with me if I incidentally bring out some of the advantages that the casting machine offers to the producer, before dwelling upon the benefits that are mutual and those that will accrue to the customer alone.

"Necessity is the mother of invention," and the casting machine came into existence through sheer necessity, not to say desperation. Carrying the iron from the pig beds has always been considered the hardest task about a blast furnace, and blast furnace labor is all rough and hard. So long, however, as the output did not exceed 100 tons a day there was comparatively little trouble. But where is the furnace to-day the daily output of which does not exceed 100 tons? Two hundred tons is considered small. The general average daily output approaches more nearly 300 tons; 400 tons is nothing unusual; 500 tons per furnace has been exceeded by the most modern furnace plant, and 600 tons daily average will undoubtedly be reached by many of the furnaces in the near future. This, however, does not necessarily imply that such large output is necessary to produce iron at a minimum cost. There is no reason why a 250-ton furnace with a properly balanced equipment and economical management cannot produce iron as cheaply as one making 600 tons a day.

To handle such enormous production by hand is almost impossible. But even with an output of 200 tons per day the laboring force required to take the iron from the cast house is the most troulbesome and the most expensive labor about the blast furnace.

No wonder furnacemen have been racking their brains in the endeavor to contrive some mechanical means to take care of the pig iron. Imagine yourself in the place of a poor furnace manager who, forced by the small margin of profit to get out a maximum product, has been chasing about all day and probably half of the night to make sure of his stock supply, to keep up his heat, his steam, his engine revolutions, to get in the necessary cinder and iron cars, so as to be certain that there would be no avoidable cause for interruption. Just imagine yourselves in his place, being rung up at 3 o'clock in the morning to come to the furnace at once, and when you get there finding the furnace full of molten iron, both sides of the cast house full of iron and the iron carriers also full.

Something must be done and done quickly, for the furnace in that condition is liable to break out at any moment. To send for the day shift would be useless, for they are probably in no better condition than the others. At any rate, it is questionable if many, or any, of them would respond. They know it is very difficult to replace them. They can afford to be independent, and you must be thankful if they are on deck to take care of the iron on their own shift. You call out the laboring gang. Every available man is put at iron carrying; and what a job the majority of them make of it! It would be funny if it were not so serious. Meanwhile the iron is getting above the line of safety. It is liable to break out any minute. The flush of cinder just out had run over and cut the monkey. You know from this that the iron will soon be getting dangerously close to the tuyeres.

Finally, one side of the cast house is cleared. The beds are being molded up as quickly as possible, while the iron is being worried out of the other side. The furnace has already been held in two hours over time. You know that one side will not begin to hold all the iron. It is therefore necessary to prepare for a cross-over. The cinder is now up to the tuyeres; the iron cannot be far away. You do not want to run another flush of cinder for fear of losing a lot of iron, and cutting the cinder cooler also, the monkey having already been lost. You cannot take the wind off, because every tuyere would immediately fill with cinder, and possibly with iron. The situation is getting more dangerous every minute. To facilitate matters you set the skimmer yourself, while the keeper is slicking up the runner, and the helpers are molding up more pig beds. At last everything is ready and the furnace is being tapped. You draw a temporary sigh of relief, for had the furnace broken out before the pig had been removed from the beds the result can be easily imagined.

Although safely over the worst, you are not certain what will happen before the iron is all landed in the pig beds, and you are just beginning to tap. It comes easy; a few blows of the sledge hammer suffice to drive the tapping bar into the molten contents of the furnace. The bar is quickly withdrawn and the liquid iron follows. The extraordinary head of iron in the hearth soon cuts the hole to double its proper size, the iron gushes forth and fills the runner to overflowing, and reaches the lower end of the cast house in a torrent. Two, three, four—yes, six beds have to be opened up simultaneously to manage the iron. Some of them overflow, sheeting the whole bed before the others are half filled. In the hurry to get the beds down, the scrap had not been carefullys ifted out and the cores were insufficiently tramped, consequently there is "jumper" after "jumper." The molten metal coming in contact with a piece of wet scrap immediately causes a boil. The liquid iron flying in every direction makes it impossible to open the beds adjacent, consequently you have to cross over before half the iron is out of the furnace. What this means must be experienced to be fully understood. Towards the end the flow of the iron becomes more controllable, but the rush of cinder is all the greater. The skimmer is washed away and what had been saved from the boil and had not been spoiled by "jump" cores is deluged by a mass of cinder. Your eyes are red from the fumes, your face is blistered, your clothes are on fire, and over half the iron is a worthless mess. You do not swear. There are no words to express your feeling. The combined vocabulary of all the languages in the universe could not furnish appropriate words sufficient to do justice to the occasion. And all this on account of inadequate means for handling the iron produced and because the iron carriers imbibed too freely. Yet who can condemn the iron carriers. The work is such that you can hardly begrudge them a day off. It was pay-day and the temptation was great.

The task of carrying pig iron is not fit to be performed by human beings. The extraordinary muscular exertion which is required bars four-fifths of the laboring class from standing up under the strain at all, and the necessity of passing back and forth between the heat and the steam in the cast house and the chilly air outside is enough to kill the stoutest. It is furthermore a fact that similar messes, more or less serious, occur when the iron carriers are at their post. Every furnaceman is ready to admit that the old way of handling the iron at the blast furnace is entirely inadequate and cannot be continued.

From this apparent digression from my subject it is evident that there was ample incentive to blast furnace managers to invent a casting machine. Such a machine is desirable from a purely selfish motive, in order to save worry, trouble and annoyance—yes, even bodily injury. It is a necessity, from a business standpoint, to do away with the most expensive labor and thus cheaper the product; and, from a humanitarian point of view, it is desirable to perform by mechanical means a task too arduous to be performed by man.

There are probably few furnace managers who have not in their hours of trial, or shortly after, invented one or more ways of displacing the iron carriers. Most of these ideas, born of desperation, never took tangible form. A large number of contrivances no doubt got on paper and were either abandoned as impracticable or the originators lacked the courage or the means to give their inventions a practical test. Not a few machines have been built and found their way into the scrap heap. But that is another story, which it would be out of place to discuss here. It is only necessary to state that there now exists a successful casting machine which does all that can be desired and that its advantages to the producer of pig iron are such that no blast furnace can afford to be without it.

In proof of this it will suffice to say that the casting machine at the Lucy Furnaces, which has been in operation since the 3rd of April, 1897, had handled up to the first of January 163,497 tons of iron, 18,000 of which was spiegel. In all that time it did not miss a single ton of the output of the two furnaces. It was and is always ready to take the iron when

*Read before the Pittsburg Foundrymen's Association, Feb. 28.

brought to it. The machine at the Duquesne Furnaces has demonstrated its capacity to take care of 1,200 tons of iron in 24 hours with ease. The cost of handling the iron at the "Lucy" Furnaces, including all repairs to the machine, ladles and refractory material, was 10.6 cents less per ton than that of handling it the old way, thus effecting a saving in labor cost of $17,330.68 in nine months, or $21,663.55 in a year.

The scrap made is less than 25 per cent of that made by the old way. Contingencieslike those faintly pictured above cannot occur. The ladles are returned to the furnace as soon as emptied and the furnace can be tapped whenever desired. There are no boils, no "jump cores," no sheeted beds; there is neither scruff nor cinder on the iron. The pigs are uniform, smooth and clean. The labor required about the machine is so easy that it looks like child's play compared with the other work about the blast furnace. Not a pig of iron is touched by hand from the time it leaves the furnace until it reaches its destination, or is piled on the stockyard.

These are, in brief, a few of the advantages that will accrue to the producers of sandless (machine-made) pig iron in which the consumer does not share. The advantages of sandless iron over sand pig, in which producer and consumer share alike, may be summed up as follows:

1. The abomination called the "sand ton" will be done away with. A ton of pig iron will be 2,240 lbs., and if it weighs that at the furnace it will weigh the same at the foundry. And with it nine-tenths of the wrangling over short weights will disappear.

2. Grading by fracture will no longer be the basis of quality and price, and this will remove the most prolific bone of contention between producer and consumer of pig iron. The fracture of pig iron is a delusion and a snare. There is not one man in ten, whether consumer or producer, that can tell by the fracture a pig of iron suited for car wheels from one fit for stove plates. At the furnace all foundry iron is graded by fracture. The pigs are broken in the middle and piled according to grade. As a rule this is done as carefully as possible; but where is the line of demarkation between succeeding grades? What is the difference between an open No. 3 and a close No. 2, for example. No matter how carefully the grading is done, there must be, by the very nature of things, in every grade some pigs closer than others. There is therefore always room for contention even when both sides are trying to be fair, which is not always the case.

The following episode has come within the writer's experience: A lot of No. 2 iron was shipped to a consumer. Before the cargo arrived at destination the price had declined 50 cents per ton. When the date of settlement came, instead of the proper remittance there came a long letter of complaint stating that the iron was not up to grade; that fully 50 per cent of it would not go better than No. 3, and that a reduction in price must be made on the iron equal to the difference in the market value between the grade sold and that actually shipped, viz., 50 cents a ton.

The case was worth investigating. When the furnace representative arrived he found a lot of samples of the iron in the office awaiting his inspection. The iron was from the lot, there was no doubt of that, and the grade was not better than an open No. 3. He knew that straight No. 2 had been shipped. So closer investigation was necessary. He went to the pig iron yard. The attendant furnished by the customer broke a lot more of the half pigs, with the same result—an open No. 3 at best. But the furnace representative happened to be equal to the occasion. He helped himself to some of the iron and broke it, and to the pretended great surprise of the purchaser, nearly every pig showed a fracture much nearer No. 1 than No. 2, and the iron was accepted as sold.

The fact is that nearly every pig of iron varies in grade from one end to the other. Not infrequently you can show up three distinct grades in one and the same pig. The sow, if at all heavy, is invariably from half to a whole grade higher than its pigs. Is the iron in the sow therefore of a better quality? This is hardly reasonable; yet you pay from 50 to 75 cents more for it. The value of an iron does not depend upon its fracture, nor is the fracture any guide as to the special purpose for which a certain iron may be best suited. It is an indication of the condition of the furnace that produced t, and not an altogether reliable indication of that even. The principal factor that determines the grain in the fracture of cast iron is the time given it to pass from the liquid to the solid state. No one is better aware of this fact than the foundryman.

Of two castings poured from the same ladle the lighter casting is invariably the closest grained. The degree of hardness resulting in a casting is not determined by the fracture of the pig, but entirely by its chemical composition and the rate of cooling. No. 1 iron may be fitted for car wheels, or it may be suited for stove plate, or it may be useless for either. How many can tell what it is suited for by the fracture? No. 1 iron may contain anywhere from ½ to 3½ per cent of silicon and the other elements, with the exception of carbon, may vary in the same proportion. Experience has taught the practical foundryman that certain brands of iron are best suited for a certain class of work. He ascertains this by trying first one and then the other, and then several brands in combination, in varying proportions, until he gets the right thing. When he has it he sticks to it. Everything goes smoothly for awhile, but suddenly something gets wrong. The castings come out hard, or lack strength; have too much shrinkage; are full of blow-holes, cold shots, and what not. What is the trouble? The same brands, the same grades, the same mixture. No change at all; yet there must be something the matter with the pig iron, and it must be in that last shipment, of course. There was no trouble until it was put on.

It is thoroughly investigated, and sure enough, the lot contains pigs with close edges; others with dense spots, and more with irregular grain. The iron is not up to grade, anyhow, and the whole shipment is condemned. If the price of iron tends downward, the producer is in for all or at least part of the damage. With a stationary market it is a toss-up, and on a rising market the consumer pockets his loss. In reality the chances are at least even that the trouble was not from the iron at all. There are as many chances as there are brands of iron in the mixture that the wrong brand was condemned. Nine times out of ten it will be used up later on and give the best results. Making up mixtures for special purposes, depending solely upon the fracture to guide you, operates on the same principle on which the Irishman got the weight of his hog. He threw a plank across a log, which he selected with great care; balanced the plank very nicely; laid the hog on one end of the plank and piled stones on the other end until it was accurately counterbalanced; and then he guessed at the weight of the stones.

The condition of the sand in the pig beds, the rapidity with which the iron fills the beds, the size of the pigs—are all factors that greatly influence the fracture. If two pigs lying side by side in the same bed happen to be of unequal size, the larger invariably will be of a higher grade than the smaller.

If the large pig is No. 1 the small one may not show better than No. 3. Has the quality suffered because the mold was not run full? Yet this pig, with many others whose fracture suffered from similar causes, goes to the No. 3 pile, and brings 75 cents less per ton.

The reverse also holds good. By proper coaxing a No. 3 can be elevated to a No. 1, and in order to please the consumer who buys on fracture, the producer does all the coaxing he can by making the pigs large, covering them up with sand, providing a third casting bed, etc., to give all the time possible for the iron to cool. Except in very wide limits, the fracture of pig iron is simply something by which to guess the quality. It is the pile of stones that counterbalances the Irishman's hog; it is something to quarrel about, and the sooner grading by fracture is abandoned the better for all concerned.

Chemical composition is the only true guide by which iron can be judged intelligently as to its quality and fitness for the purpose in hand. Chemistry in the foundry is still in its infancy and much is yet to be learned. But with foundrymen's associations established all over the country, composed of intelligent and energetic workers for the practical application of scientific principles, the advantages of chemical analysis as well as synthesis are beginning to be more generally understood and appreciated. It is only a matter of time when the benefits will be fully realized. The greatest drawback to the practical application of chemistry in the foundry is that with iron cast in the sand in the ordinary way it is almost im-

This experience should be valuable to you. It is at your service when you specify order, or use "COCHRANES."

The largest steam users, the most conservative steam users, the advisory and consulting engineers, the mechanical men, those who run the plants, those who equip them,

THESE ARE OUR CLIENTS AND REFERENCES.

THEIR APPRECIATION OF THE

COCHRANE

OIL SEPARATORS, AND LIVE STEAM SEPARATORS

IS BASED ON

The principles of separation followed or the design—the mechanical construction and, what is surely the test, the performance of these "COCHRANES," the results given in actual, every-day service, by nearly 2,000 of these appliances.

And then we have the experience obtained in building and installing all kinds—oil, live steam, air, oil, ammonia; horz., vert., angle; cast iron, cast steel, wrought steel; receivers of huge capacity—all pressures, special shapes and for special conditions.

Harrison Safety Boiler Works, Philadelphia, Pa.

possible to get shipments of uniform composition. This is due to the fact that the iron as it flows from the furnace is very irregular; and it not infrequently happens that there is a difference of 1½ per cent in the silicon from the first to the last bed in a cast of iron of practically the same grade.

The last, but not least, mutual benefit that will be derived from the use of the machine for casting sandless foundry iron is that it will be not only possible but very easy to furnish iron of uniform composition. The iron of each ladle containing 15 to 20 tons will be of necessity uniform, and can be analyzed easily and piled or shipped according to analysis.

We now come to the advantages that sandless pig iron will have for the consumer alone. In the first place I am authorized to say that in the basic open-hearth furnaces at Homestead, where all the iron produced by the "Lucy" furnaces has been consumed, sandless pig iron has been demonstrated to be worth at least 50 cents a ton more than sand iron of the same composition. This enhanced value is due first to the fact that it melts more readily than iron with a crust of sand about it, and is in a more advanced state of reduction when melted. Hence it is more quickly converted. Second, the sand damages the hearth and requires additional flux. The sandless pig is harmless and the flux required is a minimum. Thus material is saved as well as wear and tear. Third, in consequence less fuel is required to convert the sandless pig into steel, which results in, fourth, an increased output.

The same holds true in remelting in the cupola for Bessemer steel. The sandless pig requires less flux, less fuel, melts more quickly, and results in appreciably less wear and tear in the cupola. As yet no systematic tests have been carried out, but the advantage of the sandless pig iron is easily estimated at 10 cents per ton. From this I feel warranted in drawing the inference that a similar saving, though possibly, owing to the intermittent work, less in degree should result with sandless iron in the foundry cupola.

The results obtained by Mr. Thos. D. West, which were presented at your last meeting, indicate clearly that there is less oxidation from clean iron than from iron cast in the sand otherwise of identical composition. The average of Mr. West's experiments showed the loss by oxidation in remelting sand iron to be 5.5 per cent, while the loss in sandless iron was only 3.4 per cent. Taking pig iron at $10 a ton the loss on the sand iron would be 55 cents, against 34 cents on sandless pig—a clear gain in favor of the machine iron of 21 cents per ton. These results will require corroboration on a larger scale before they can be taken as absolute, but they indicate what may be expected.

The sandless iron melts more quickly and with less fuel than the sand pig. It is less liable to be contaminated by the impurities in the fuel. It will require less flux and will make a cleaner casting. In short, the indications are that it will prove in every way superior to the sand pig for foundry use.

I thank you for the honor of appearing before you and for your kind attention, and permit me to express the hope that at a future date I may be able to bring before you something more definite as to the behavior and merits of sandless iron in the foundry.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

The Dayton Foundry Co., Dayton, O., has been incorporated by W. L. Barthelemy, A. Barthelemy, Frank Freed, Casper Pierson and Charles Treon, to engage in a general foundry business, and will have $10,000 capital stock.

The Pyott Foundry Co. has been incorporated at Chicago, with capital stock of $10,000, by George W. Pyott, Albert Pyott and William C. Pyott.

The Washburn Coupler Co., has been incorporated at Minneapolis, Minn., to manufacture car couplers and railroad supplies. The capital stock is $100,000, all paid in. The incorporators are William D. Washburn, Edwin C. Washburn, Caleb C. Crane.

The Egan Mfg. Co., with a capital of $25,000, has been incorporated at Milwaukee, Wis. William J. Egan, Edward J. McDonough and Joseph Meyer are the incorporators. The company will manufacture machinery and electrical apparatus.

The Jarvis Rotary Engine Co., of Smith Center, Kan., has been incorporated, with a capital stock of $12,500. The directors are G. Whittelshofer, Ben. T. Baker, J. W. Harwood, A. Haberly, Lee Starbuck, R. R. Clark and Henry Williams, of Smith Center.

The American Bronze Foundry Co. has been incorporated at Chicago, with capital stock of $10,000. The incorporators are Paul Cornell, Jr., Julius Bercham and J. A. Graves.

The Weir-Reeder Sheet Iron Co. has been incorporated at Louisville, Ky., to buy, sell and manufacture sheet iron. The capital stock is $10,000, and the officers are William Weir, president; Joseph F. Reeder, secretary and treasurer, and James A. Starr, general manager.

The Power Pump and Motor Co. has been licensed to incorporate at Oregon, Ill., with capital stock of $24,000. Incorporators are Harvey Jewett, Daniel A. Bellis and William L. Taylor.

The Acetylene Generator Mfg. Co. has been licensed to incorporate at Chicago, with a capital stock of $50,000, to manufacture gas generators. The incorporators are H. W. Carter, A. H. Graves and C. W. Beck.

The American Motor Syndicate has been licensed to incorporate at Chicago, to manufacture engines. The capital stock is $2,400, and incorporators are D. H. Fletcher, F. S. Dixon and J. S. McGregor.

The Parlin & Orendorff Co., Canton, Ill., whose intention to build a foundry was announced in this column recently, is in the market for a cupola and other foundry equipment. The company will also install a new steam plant of 755 h. p., including a 24 x 48 Corliss engine, to develop from 300 to 350 h. p, making 70 to 72 revolutions.

The Warrior Machine Works, Birmingham, Ala., will buy a second-hand crank and fly wheel air compressor, having a cylinder 20x20x30-inch stroke; also one having cylinder 24x24x36-inch stroke.

An application for a charter has been filed for the Dupes &

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick

GOVERNMENT ⁑ STANDARD.

Established 1841. Capacity, 60,000 Per Day; 18,000,000 Per Year.

The First Manufactory of its Kind in the U. S.

Home Office and Works:—**MOUNT SAVAGE, Alleganv County, Md.**

Branch Offices:—No. 1 Broadway, New York, N. Y.; No. 222 So. Third St., Philadelphia, Pa.; Ferguson Block, Pittsburgh, Pa., Stowe, Fuller & Co., 195 Merwin St., Cleveland, Ohio.

OTIS STEEL

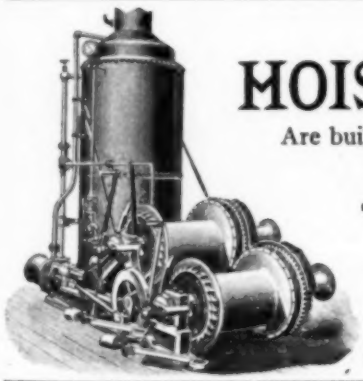
"OTIS" FIRE-BOX PLATES A SPECIALTY.

Flange Plates, Ship Plates, Tank Plates, Steel Car Axles and Forgings of all kinds.

Steel Castings from 100 to 75,000 lbs.

Head Office and Works, CLEVELAND, OHIO.

Agencies: NEW YORK, 97 Cedar St. CHICAGO, Old Colony Bldg.
ST. LOUIS, 516 N. Third St. WASHINGTON, Kellogg Bldg.
MONTREAL, J. G. Sibbald, 3 Windsor Hotel.
SAN FRANCISCO, John Woodlock, 26 Beale St.



LIDGERWOOD

MOISTING ENGINES

Are built to Gauge on the Duplicate Part System.
QUICK DELIVERY ASSURED.

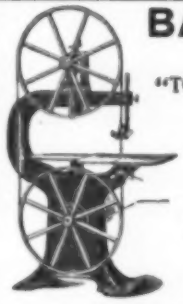
----STANDARD FOR QUALITY AND DUTY.

FOR BUILDING PURPOSES, PILE DRIVING, EXCAVATING, ETC.

LIDGERWOOD MFG. CO.,

96 LIBERTY STREET, NEW YORK.

Chicago, Cleveland, Philadelphia,
Portland, Ore. Boston, New Orleans.



BAND-SAW

Machines,
"TO BEAT THE BAND."

Belt Power and Foot Power.

Our Machines have Modern Improvements. Made in three sizes. Circulars and prices on application.

CRESCENT MACHINE CO.
LEETONIA, O.
No. 4 Front Street.

Subscribe for The Iron Trade Review.

Adams Mfg. Co., Chattanooga, Tenn.; incorporators, George Dupes, T. F. Adams, D. C. Richards, W. E. Richards and Arthur T. Richards, to manufacture cutterheads and other machinery. D. C. Richards may be addressed.

"F," care *The Iron Trade Review*, is in the market for a second-hand ore crusher eight-inch to 10-inch opening.

G. F. Paddison, Eau Gallie, Fla., wants to buy fence-weaving machines operated by steam power.

L. L. Birch, Wassaic, N. Y., will buy machinery for turning and forming heavy wire into small articles.

New Construction:—

The Bullock Electric Mfg. Co., Cincinnati, O., will build two new factories, 100 x 250 feet, each, with a building for drafting room and offices, and also a boiler house.

Press reports state that the Western Hardware Mfg. Co., Milwaukee, Wis., will build an extensive plant.

It is stated that the Harrisburg Foundry & Machine Works, Harrisburg, Pa., will rebuild its entire plant. It is also contemplated to considerably increase the facilities for manufacturing automatic engines for electric service, and to add several new lines of engines.

The Woodsons Steel Co., of Pittsburg, has been chartered and a new Bessemer plant will be erected about 24 miles above Pittsburg on the Monongahela River. It will be equipped with two 8-ton converters, cupolas, soaking pits, continuous blooming train, cranes, and everything needed to constitute a modern plant. Electricity will be principally used for driving the machinery and will largely take the place of steam. The output of the plant will be about 1,000 tons of steel per day, either billets or sheet bars being turned out. The erection of blast furnaces later is a possibility. The W. Dewees Wood Co., McKeesport; Wellsville Plate & Sheet Iron Co., Wellsville, O.; J. Wood & Bros., Conshohocken, and Allan W. Wood Co., Philadelphia, will consume about one-third of the entire output.

A. Adamson, proprietor of the Adamson Foundry & Machine Works, Akron, O., will build a foundry the coming spring, it is reported. It will be 50x100 feet.

The Berlin Iron Bridge Co., of East Berlin, Conn., are building a new boiler house roof for the Coe Brass Mfg. Co., at Ansonia, Conn.

At Louisville, Ky., Bridgeford & Co. will secure site and build a new foundry; A. B. W. Allen, manager.

The Fulton Foundry Co., Cleveland, will build a foundry, of steel construction, 80x120 feet.

Work is in progress at Kenton, O., on two new buildings for the Champion Iron Co. They will be 150x62 feet and 80x40 feet.

A retort coke oven plant, with by-product recovery equipment, will be built at Birmingham, Ala., it is reported. Sol Haas and A. T. London, of the Sloss Iron & Steel Co., are interested. The gas will be used for illuminating purposes.

Additions, Enlargements, Removals, Etc.:—

A recent dispatch from Joliet, Ill., said that the Illinois Steel Co. will expend $250,000 in improvements and additions to its plant there. At the Chicago offices of the company it was said that matters have not progressed far enough yet for the company to make any announcement of its plans or statement of any kind.

U. BAIRD MACHINERY CO.,

123-125 Water St., **PITTSBURG, PA.,** 124-126 First Ave.

Machine Tools and Supplies. Send for list of Second-hand Tools.

BILLET AND SLAB CONVEYORS,

BAR IRON CONVEYORS,

MECHANICAL BOSHES.

Complete plants designed and erected with guaranteed results.

Labor-Saving Devices and Conveying Machinery of All Kinds.

HEYL & PATTERSON, Pittsburg, Pa. Office: 108 Market St.

THE ANDREW PATENT GRIP SOCKET.

Holds straight or taper shank drills perfectly rigid. Protects the Shank until the drill is completely worn out. Old taper Shank drills with tangs broken off used just as well as new drills. Beware of infringements.

M. L. ANDREW & CO.,
60-62 Elm St., Cincinnati, O.

SILICA BRICK

For Iron and Steel Furnaces, Glass Furnaces, etc.

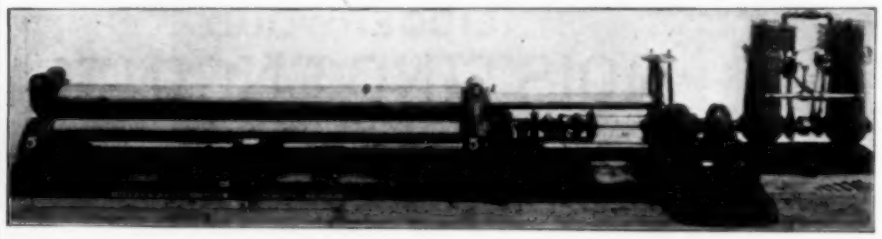
SPECIAL SHAPES MADE TO ORDER.

DIAMOND FIRE BRICK WORKS,

AKRON, OHIO.

Persistence In Advertising

Is one of the requisites of satisfactory results. In the expansion of business which is now noticable in every section of the country, advertisers who have made themselves regularly prominent in the past twoyears will be first to reap the rewards of persistent publicity-



BENDING ROLLS.

Any distance between housings and for all thicknesses of plate.
Punches Shears. Plate Planers. Straightening Rolls, etc.
SEND FOR CATALOGUE.

HILLES & JONES CO., 908 Church St., Wilmington, Delaware.

PUNCHES AND SHEARS

OF ALL KINDS

MANUFACTURED BY

The Long & Allstatter Co.,

HAMILTON, OHIO.

Send for catalogue.

When you write to firms advertised in our columns, please mention the fact that you took their address from our paper. They will thank you for it.

Fires and Accidents:—

Fire starting in the pattern shop of the Excelsior Iron Co., 87 to 100 Clinton st., Chicago, last week, caused a total loss of $25,000, fully covered by insurance. The losses are divided as follows: Excelsior Iron Co., $18,000; building (owner, George Mason), $5,000; Rudolphi & Krummel, machine shop, $1,000; G. M. Davis, machine shop, $1,000. The structure is surrounded on all sides by factories and warehouses, and for a time it was feared these buildings would also catch fire.

General Industrial Notes:—

The new black plate mill of Hamilton & Co , of West Newton, Pa , has been completed and put in operation.

The Puget Sound Wire Nail & Steel Co., Everett, Wash., has been put in operation after a long period of idleness.

C. Seymour Dutton, formerly president and general manager of the Finished Steel Co., Youngstown, O., has resigned and is succeeded as president by Henry M. Garlick. T. E. Davey, formerly secretary and treasurer, has been made general manager. The plant is running full. The product is polished steel shafting up to 5½ inches diameter.

The plant of the Monroe Foundry & Machine Shops, Monroe, Wis., has been sold to A. Lanz & Sons.

The Fort Worth Iron Works Co., Fort Worth, Tex., will begin the manufacture of a steam engine of a high class, which will be the first engine manufactured in the State, excepting the one made at the penitentiary at Huntsville.

Dilworth, Porter & Co., Ltd., of Pittsburg, manufacturers of railroad spikes, have received an order for 1,000 kegs for shipment to Germany.

Miller, Wagoner, Fieser & Co., pig iron dealers of Columbus, O., have opened a branch office in room No. 503 Hamilton Building, Pittsburg, Pa., with Linn Bentley in charge.

On April 1 the Pittsburg office of the National Foundry & Pipe Works, Ltd., of Scottdale, Pa., will remove from the Lewis Block to the new Murtland Building.

At the plant of the Totten & Hogg Iron and Steel Foundry Co., Pittsburg, a complete electric lighting plant has been installed recently that supplies 35 arc and 150 incandescent lamps to the office, foundry, machine shop, pattern house and store house. The dynamo was a Thompson-Ryan Co. machine of 40 h. p.

The J. S. McCormick Co., 25th street and A. V. Ry., Pittsburg, dealing in foundry facings and general foundry supplies, finds the foundry interests more active than at any time in three years. The company is runnng to full capacity.

At the Addyston Pipe & Steel Co.'s plant, at Newport, Ky., work was resumed last week in the new part which had been idle several months. Seventy-five additional men were given work.

The plant of the Walter A. Wood Harvester Co., at St. Paul, Minn., will not be operated the coming season, the manufacture of harvesters there not having been profitable. However, the foundry will continue to run, as it is doing well and has good orders on hand.

Some large outputs have been made recently by Cleveland wire, wire rod and wire nail mills. The Cleveland Rolling Mill Co.'s wire rod mill turned out 330 tons in 24 hours on a recent day, while other 24-hour records in the same week were almost as large. At the HP. Nail Co.'s plant, 6,358 kegs of nails were turned out in one day, working 21 hours. This is believed to be in excess of any record made.

At Ashland,, Ky., the Norton Iron Works mill engine had a bad break-down last week. The damage will mean several weeks' idleness.

The Westinghouse Electric & Mfg. Co. has received large contracts for electrical equipment from the great packing houses of Swift & Co., and Nelson Morris & Co., to be placed in new plants in St. Joseph, Mo. The order of Swift & Co. consists of one 250 kilo-watt Tesla polyphase generator and an 800 kilo-watt 220 volt generator. The order of the Morris Co. consists of a 440 volt Tesla polyphase generator, one of 120 kilo-watt capacity and another of 50 kilo-watt, and 20 polyphase motors, ranging in size from 3 to 400 h. p. The Westinghouse company has also received the contract for two alternating current generators for the Canadian Niagara Power Co., which will have a capacity of 1,000 h. p.

The Pittsburg Locomotive Works are constructing for the Kan Sai Trading Co., of Japan, six locomotives of the compound cylinder type, and weighing about 80,000 pounds each.

Car and locomotive building: It is understood that the Pennsylvania Co. will build 100 locomotives this year. The Baldwin Locomotive Works are building three locomotives for the Sorocabana & Ituana Railroad, two for the Kansas City Belt Line, 14 for the Russian State railroads, 20 for another Russian railway, and two for the Indianapolis Union Railway. The Wheeling & Lake Erie will buy some engines, it is reported. The Hankaku Railroad of Japan, will buy two engines. The Canadian Pacific may be in the market soon. The Chicago, Indianapolis & Louisville will buy 250 flat, 50 stock and 200 box cars. The Chicago, Rock Island & Pacific will place some furniture cars. The Illinois Car & Equipment Co. has an order for 250 box cars for the Rio Grande Western, 50 box cars for the Mobile & Birmingham, and one for 50 flat cars from the Kansas City, Fort Scott & Memphis.

Hannah Furnace of the Mahoning Valley Iron Co., Youngstown, O., which has been banked recently for repairs to its engine, started up Feb. 21.

The furnace at the Etna plant at Ironton, O., which was sold at public sale some months ago, has been inspected recently by experts with a view to a report to possible investors.

It is stated that the Pennsylvania Co.'s locomotive order to its own shops will be about 100 this year—many of them of the large type of freight engines, a dozen large passenger engines, a number of moguls for the lines west of Pittsburg, and the balance of standard size. A number of high grade passenger coaches, about 50, will be built.

The Pennsylvania Steel Co. is employing 1,172 more men than at this time last year, and on full and extra time; while last year only three days a week were averaged. A recent order is for 12,000 tons of rails for the Manhattan Co.

EDWIN HARRINGTON, SON & CO., Inc.,

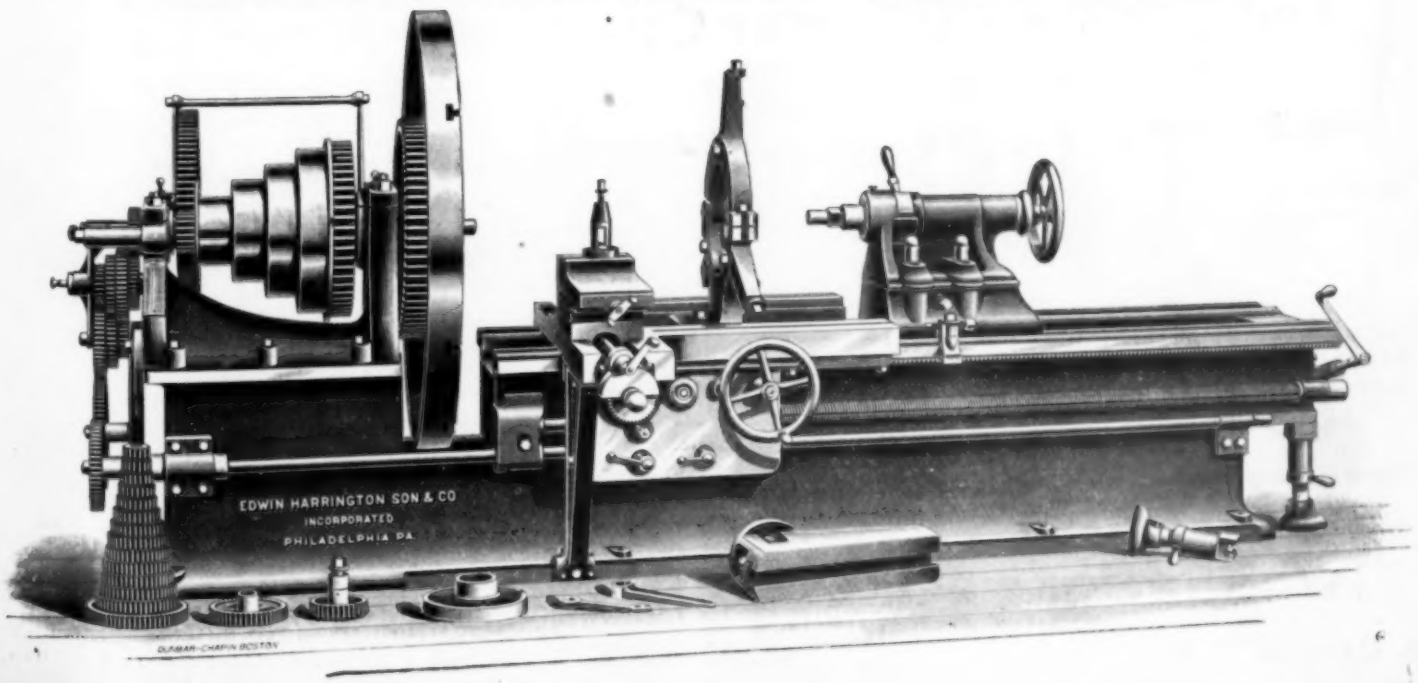
1526 PENNA. AVE., PHILADELPHIA, PA.

Designers and Manufacturers of MODERN MACHINE TOOLS.

EXTENSION LATHES: Strong, Handy, Powerful. Bed Opens to admit work of Large Diameters.

DRILL PRESSES, MILLING MACHINES,

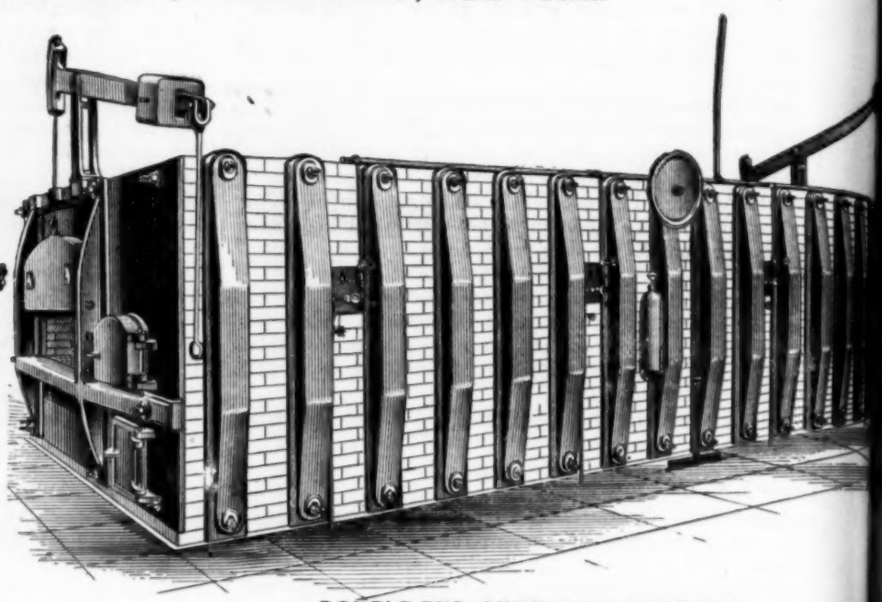
ELECTRIC AND HAND-POWER HOISTS.



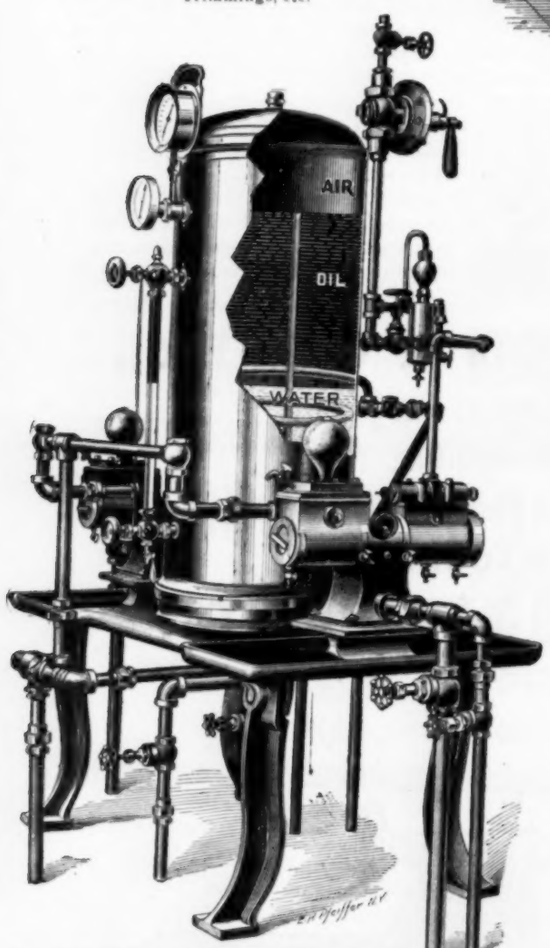
OIL FUEL.

If you are interested in Oil Heated Furnaces and Fuel Oil Burning Appliances,
W. S. ROCKWELL & CO., 26 Cortlandt St., NEW YORK.

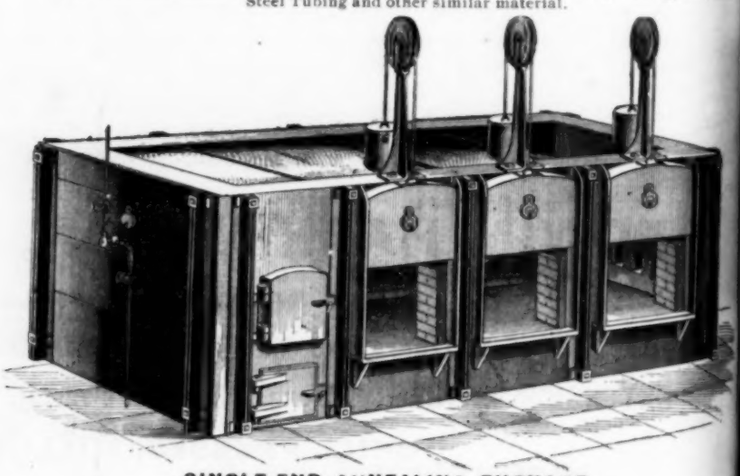
BRAZING FURNACE
For Brazing Bicycle Parts, Copper Wire, Gun Trimmings, etc.



DOUBLE-END ANNEALING FURNACE
For Annealing Brass and Copper in Sheets, Strips, Bales, Rods, Bars, Tubing, etc.; also Steel Tubing and other similar material.



ROCKWELL'S IMPROVED DUPLEX SYSTEM FOR BURNING FUEL OIL.
Heats, Cleans and Delivers the Oil to the Fires Under a High Uniform Pressure.



SINGLE-END ANNEALING FURNACE
For Annealing in Packing Boxes or Cylinders such articles as Machine Parts, Bicycle Fittings, Barrels and Trimmings, Steel Pens, Files, Spoon Blanks, Light Brass and Copper, etc.

We make estimates and equip plants complete for burning oil.
We design and build furnaces of every description for manufacturing purposes using oil, gas or coal as fuel. Write for catalogue.

REGENERATIVE FORGING AND WELDING FURNA
For Forging and Welding all kinds of Iron and Steel Work.

W. S. ROCKWELL & CO.,
26 Cortlandt St., NEW YORK.